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THE NEGATIVE IMPACT OF TRIPS ON GENDER RIGHTS IN ACCESS TO
HEALTH AND FOOD IN INDIA: A STUDY OF THE DYNAMICS OF
KNOWLEDGE ECONOMY AND NEO-MEDIEVAL GOVERNANCE

A Dissertation

Presented to

the Faculty of the Josef Korbel School of International Studies

University of Denver

In Partial Fulfillment

of the Requirements for the Degree

Doctor of Philosophy

by

Kausiki Mukhopadhyay

June 2014

Advisor: Jack Donnelly

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Title: THE NEGATIVE IMPACT OF TRIPS ON GENDER RIGHTS IN ACCESS TO HEALTH AND FOOD IN INDIA: A STUDY OF THE DYNAMICS OF KNOWLEDGE ECONOMY AND NEO-MEDIEVAL GOVERNANCE

Advisor: Jack Donnelly

Degree Date: June 2014

ABSTRACT

Southern developing nations are increasingly emulating the knowledge economy followed by the developed nations of the North. This paradigm is characterized by the signature feature of the regime of TRIPS or individualized legal patents, particularly bio-patents developed through biotechnology in pharmaceutical and agriculture. It is also characterized by corporate social responsibility as a market mode of governance of development and increasing state retrenchment from delivery of public welfare. This form of economy is embedded in multilayered governance of neo-medieval governance where states and corporations tussle for the right to define growth and equity. This thesis argues that such a mode of economy and governance has failed to deliver equity for the marginalized poor women in India. This is explicated through four critical factors. First, there is increasing biopiracy of tribal women's traditional knowledge and denuding of uncodified knowledge of tribal women due to land deprivation which in turn severely affects their health. Second, a thriving pharmaceutical sector has failed to deliver health equity for poor women, particularly by being engaged in creation of medicines that do not have relevance for the main disease profile of the poor – communicable diseases. Third, there is rise of non-communicable diseases of the poor. Patents act as legal barriers to access to medicine and severely impact the health of the poor. Fourth, the rise of Bt

seeds in cash crop agriculture has meant that traditionally saved and used food crop seeds are being marginalized and there is a growing agrarian crisis for women who do not have control over land, seeds and seed technology. Fifth, poverty is on the rise which is a sure sign that equity has not trickled down. If the international society of states provides for customized patents for women's traditional knowledge, women's knowledge, health and food security would be better secured.

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CHAPTER ONE: INTRODUCTION

Simply told, the topic is about the impact of economic growth on human rights of women (both political and socio-economic) as manifested in distributional equity in India. To cut into this topic, we can start with a top-down view as well as a bottom-up view in order to see the interactive dynamics of how the topic unfolds historically and where it stands currently. I have sought to represent this by creating reverse images of the main themes in Fig. 1 and 2. Hence, the topic translates into this question - ‘How is gender rights, as manifested in equity, impacted in the context of a growth-oriented knowledge-economy embedded within a neo-medieval form of governance?’

To explore the above mentioned question I develop three figures, the last of which is a model. I begin this chapter by first exploring the rationale for figure 1 and 2 and then go on to describe the model on which the dissertation is based. After this I explore in detail the concepts that are introduced in the question laid above - gender issues, knowledge-economy, neo-medieval governance and the nature of the state of India. I also introduce a couple of related important concepts such as, biotechnology and corporate

social responsibility (CSR). I follow it up with a brief description of how I execute my study and the structure of the chapters that follow.

The Rationale for Figure 1 and 2

Given the universality of gender discrimination, throughout the world, policy-orientations and governance structures of implementations tend to be one-sided, i.e., they tend to focus on economic growth without assessing whether such growth leads to generation of gender welfare (Gandhi 2010), even when there are attempts to rectify the imbalances through policies of fair trade (Das 2011). Given this ideological blindness, my dissertation seeks to look at how the lacunae are enhanced by other international, national and local ideological systems. Hence, I introduce a three-tiered model that looks at the international, national and local impacts of ‘ideologically-driven’ policy-measures undertaken in two critical sectors – food and health - that are important to a basic human right – ‘the right to life’ (Helfer and Austin 2011).

Since ‘right to life’ is a measure of human rights, I seek to see how it has been enhanced or constrained by the regime of Trade Related Intellectual Property Rights (TRIPS). Helfer and Austin (2011) provide a full review of the extant human rights and intellectual property regimes and institutions and laws; the rationale for the disjuncture between the two in a historical context; and demonstrate the growing tension between the requirements of the two regimes. The tension is heightened by the fact that corporations now claim protection of human rights, in the name of right to property, in order to protect their patents. The authors view the solutions to the problem in terms of conflict (where jus cogens is given to human rights through legal precedence of Universal Declaration of

Human Rights over TRIPS and soft law developments through international activism); coexistence (trade-offs or balance between the two rights – human rights in general and right to property – are sought to be found); or adopting policies that go beyond it (in short, adopt whatever postures that help bring about positive outcomes). I seek to enshrine in my model jus cogens in the international arena because of my skepticism about India's priorities and commitment to human rights. While at the international level, India has been involved in movements that seek to restrict the realm of and impact of intellectual property right (IPR) in order to deliver equity (Helfer and Austin 2011) at the domestic level, it has failed to demonstrate the same level of commitment in delivering equity.¹

Given India's problematic deliverance on the right to life at the domestic level, in order to explore the impact of 'right to life' in access to food and health, I look at a critical growth policy – the TRIPS and its resultant specific product patent - bio-patent. The TRIPS, is the epitome of growth policies instituted in the 'liberal' World Trade Organization (WTO).

¹ According to Chadha Behera (2009), there is a hierarchical difference between the dominant West and the dominated non-West in IR theory. Indian IR, according to her, is uncritically accepting of the state as a 'benevolent protector' rather than an oppressor. Moreover, the 'Master Narrative' of a Westphalian state is created in the West and India simply, seeks to find a place within. Given this background, it is ironical to note that corporations are also raising the private norms of CSR to demonstrate their sincere faith to upholding human rights. Such Western rules of CSR, 'solo,' carry minimal global legitimacy. They do not carry the type of heavy weight of international recognition and legitimacy that sovereign states' rules do. Though both states and markets are 'master institutions,' states have de jure and de facto international recognition while markets have only de facto recognition in the global arena. Markets, hence, can thrive only under the legitimacy umbrella of sovereign states and gain legitimacy by being embedded in multilateral processes of states (Buzan, 2004). Markets can exert coercive disciplinary pressure on states, but in the final analysis, it is the states that have the right to enact legal actions that have the genuine 'power' of being-backed by penalties/sanctions. States are generally expected to enact laws based on the moral wellsprings of the multi-stakeholder social arena, but as demonstrated in the history of TRIPS, particularly in the context of hegemonic, yet non-altruistic decision-making by the US (Helfer and Austin, 2011), states have typically failed to do so.

The WTO as an international institution, propagating the ideology of the ‘knowledge economy’ as the most efficient way of producing growth, rationalized the policy of patents as critical drivers for growth, and as critical incentive for attracting foreign direct investment (FDI) for economic growth (Rao and Dhar 2011). From a feminist perspective Schwarzenbach (2011) provides a comprehensive critique of state-driven, but, ‘international’ organization WTO’s ‘integrating’ trade practices that affect ‘reproductive’ activities or praxis/labor of women.²

The form of knowledge-economy, advocated by the WTO is embedded within another ideological system – the neo-medieval form of governance that administers the implementation of such policies. Feminists heavily criticize the skewed and unjust character of both the idea-systems and their modalities of execution. This is because the promised equity has failed to emerge despite liberalization in trade by developing nations. Not only that, as I elaborate later, the modern regime of bio-patents, as executed within the realm of a multi-layered neo-medieval governance has led to a vast disjuncture between the arena of women’s social capital – a network of socially connected individuals - and the space within which it resides – nature and its natural capital that provides critical resources to constant regeneration of the social arena in terms of innovation, development and human rights.

It is in light of the above-mentioned failure in development/progress of human rights that one needs to look at the state of women’s rights in India and the governments’

² There are also policy implications of measures taken or not taken to develop the agricultural sector in India due to trade rules that limit subsidies.

response to protecting and enhancing these rights. In comparison to the world, in India, as a whole, gender rights are severely underdeveloped and abused. This is primarily due to cultural reasons that favor having male child over female (Biswas 2011). This cultural predisposition has been severely exacerbated due to the conjunction of several political and political-economic factors.

The following are several factors that exacerbate extant gender inequity in India. First, the governments' priority of liberalizing the economy with a focus on growth, has led to both skewed and incoherent policy measures in the two key arenas critical for women's development of human capital - health (as evidenced in policies directed towards the pharmaceutical companies and development measures for women consumers) and food (as evidenced in policies directed towards agribusiness companies and development measures for women farmers and consumers). This is evidenced in growing food insecurity and associated malnutrition and lack of access to medicine for a pervasive disease like HIV/AIDS.

Second, the governments' focus is increasingly on accumulating political clout/power in the international arena as an emerging country- as part of the increasingly powerful BRICS, and as a member of a powerful group of nations - G20 (Wagner 2010; Mukherjee and Malone 2011). This focus involves maintaining its high growth figures through creation of India Inc. – its conglomerate of 'champion' corporations with competitive advantage in the global arena (a measure that has been adopted through mimicking of the developed world's policies) as evidenced in a recent Financial Express (2011) article. This article points out how recent US healthcare reform offers

opportunities for Indian companies to gain outsourcing activities geared towards developing drugs for developed countries, at a time when healthcare is being deprived for a vast majority of poor in the country. It is also reinforced by Kamiike and Sato's (2011) claim that the Indian government's current negotiations on TRIPS through bilateral treaty seek to protect the domestic generic pharmaceutical industry, whose growth strategy is vested in serving the developed country through providing currently numerous off-patent drugs (Dhar and Gopakumar 2010). But, even this strategy is under threat as many major Indian companies has been taken over by foreign MNCs making India's pharmaceutical market more oligopolistic and causing drug prices to skyrocket (Singh 2011; Rama 2011).³

India's skewed priority of growth has also meant that India's nascent biotech industry (critical for generating locally needed health solutions) due to lack of financial capability to scale-up R&D, particularly through clinical trials, and the ability to market drugs has been increasingly resorting to licensing out their innovations to Big Pharma or engaging in Contract Research and Manufacturing Services for the Big Pharma (Kamiike and Sato 2011). This has not translated into reduction in medicine prices and better healthcare for the majority of India's poor (Shrivastav 2011).

³ Singh (2011), points out that National Pharmaceutical Pricing Authority (NPPA) has found out that competition is ineffective because global drug-makers have a clout with doctors and physicians prefer to prescribe originals despite high price. The pharmaceuticals department of the Indian government is now going to mull this over, as it and not NPPA has the regulatory authority. This fact is confirmed by a study undertaken by Sanyal and Datta (2011). According to Rama (2011), nearly two-thirds of Indians do not have access to essential medicines and that on average the cost of Indian's drug consumption is among the lowest in the world.

In the pursuit of growth, 'contracting' is increasingly becoming the dominant norm in India. This is seen not just in pharmaceuticals, but also in agriculture. Agriculture is currently experiencing severe volatility in prices due to financial speculations; pressure on land and resources due to the emergence of unsustainable biofuels cultivation; and due to the demand of the emerging middle-class for high value fruits and vegetables and high-protein/meat-oriented diets (Brooks and Loevinsohn 2011). While the middle-class is being appeased through growth of contract farming, as it increases their basket of consumption-choices, increasingly more people are falling below poverty line (Patnaik 2010) and experiencing food insecurity.⁴ India's growing scenario of fractured class and alliance dynamics is captured well by Palit (2011).

Contract farming's viability and contribution to welfare is debatable (Singh et al. 2011). The national government does not have any formal legal policy on contract farming yet, even though many domestic MNCs and foreign MNCs have already started engaging in it. India had declared in 2000, a National Agricultural Policy designed to bring scarce land (particularly what it deemed as wastelands) and water, and a rich variety of genetic endowments into the realm of privatization, without any clear strategies for development, such as reform of tenancy and lease rights, channeling public funds for infrastructure development as a basis of capital formation in rural areas, and so on.

Given the lack of a clear vision, multiple problems, despite the touted benefits, have emerged in contract farming. One such problem is conversion of fertile lands from

⁴ According to the World Bank Report (2011), women are faced with a double burden of labor. Men's increasing urban migration has meant that women have to cultivate lands and take care of household duties. Increasing feminization of agriculture has been going hand in hand with increasing poverty and food insecurity.

staple ‘food crops,’ such as cereals to cash crops or high value mono-crops that undermine food diversity. Another problem is that such contracting benefits mostly large farmers, some middle farmers and hardly any small and marginal farmers. In any case, the ‘power of contracting,’ including the power to default, as in failure to buy the contracted product on arbitrary grounds, definitely resides with the agribusiness company. This inequality of power does not convert into welfare for the poor and the marginalized, whom the agribusiness consider as ‘too unprofitable’ to invest in because of high transaction costs (Khairnar and Yelati 2005; Sharma 2007). The overall focus on power through growth by the Indian government has further worsened India’s extant skewed distributional priorities – a critical issue of human rights and justice (Samaddar 2011).

Third, worsening political security scenarios in terms of international (not covered in my thesis) and domestic terrorism has increasingly led to diversion of resources away from equity-oriented policies to building-up of defense measures. According to Kadyan (2010), the Revenue expenditure of Defence has grown from Rs. 10,194 cores in 1989-90 to Rs. 87,344 crore in 2010-11, i.e. an increase of almost nine times during the last two decades. The current budget of 2011 reflects an increase in almost 4% from 2009-2010 layout.

Fourth, structural barriers, such as, lack of land redistribution, land grabs, pervasive corruption, lack of developmental infrastructure, lack of strong ‘functioning’ institutional protection (this implies that measures may be in place, but they are ineffective due to lack of or weak implementation,) [Ghate and Ghate 2010; Dandekar

and Choudhury 2010] and so on, has led to unbalanced growth, and has further worsened inequality and hence, women's basic 'right to life,' a critical pre-requisite for innovation.

Feminists and other human-rights activists point out that human rights as enshrined in the international Universal Declaration of Human Rights should take precedence over all other international and national laws. Hence, public laws of human rights should have jus cogens or preponderance over all other international and national laws, whether public or private, in order to ensure 'fair governance.'⁵ Human right activists stoutly advocate for viewing the world through human rights lens rather than the lens provided by international corporations and their supposedly detached, 'objective' state-sponsors of the market arena within which corporations function.

A human rights lens can be used to reflect the dysfunctional collapse of international 'state' politics and international and national political-economy activities of 'states and corporations' in the arenas of growth and equity, to the severe detriment of development of the weak and marginalized women's human rights. Hence, human rights activists advocate for a civil-society pushback on policy-arena and monitoring of corporate activities through non-governmental organizational (NGO) activities – transnational and national – particularly, those that relate to developmental activities.

Dedicated, organized and highly aware NGO activities can help deliver radical and

⁵ Normative hierarchy theory is an increasingly popular theory in the field of human rights. According to this theory, state's jurisdictional immunity is abrogated when the state violates human rights protections that are considered peremptory international law norms, known as jus cogens. Since state immunity is not jus cogens, it ranks lower in the hierarchy of international law norms, and hence, can be overcome when a jus cogens norm is at stake (Michaels and Pauwelyn, 2012).

incremental innovations at the civil-society level – to both individuals and to the communities within which the individuals are embedded.

Despite constraints, NGOs can help deliver human rights through the power of networking (Sell 2004), sustainable growth and equity by not only providing ‘new’ measures of developing human-capital, innovation, and development as a whole, but, by also tapping into and helping to organize profitably ‘traditional’ modus-operandi of knowledge innovation. Traditional modes of knowledge innovation have been around for thousands of years in both the health and food sector in India. However, in both these sectors, women’s rights are severely underdeveloped as producers and consumers. Here, women require significant help in not only conserving and using their traditional knowledge, but also developing new modes of innovation. They also require access to ‘modern’ modes of survival, such as, modern healthcare systems including hospitals and synthetic drugs to fight pervasive health disasters such as HIV/AIDS. They require access to measures that help them in their food production activities, such as, access to land, capital, and so on.

FIGURE 1

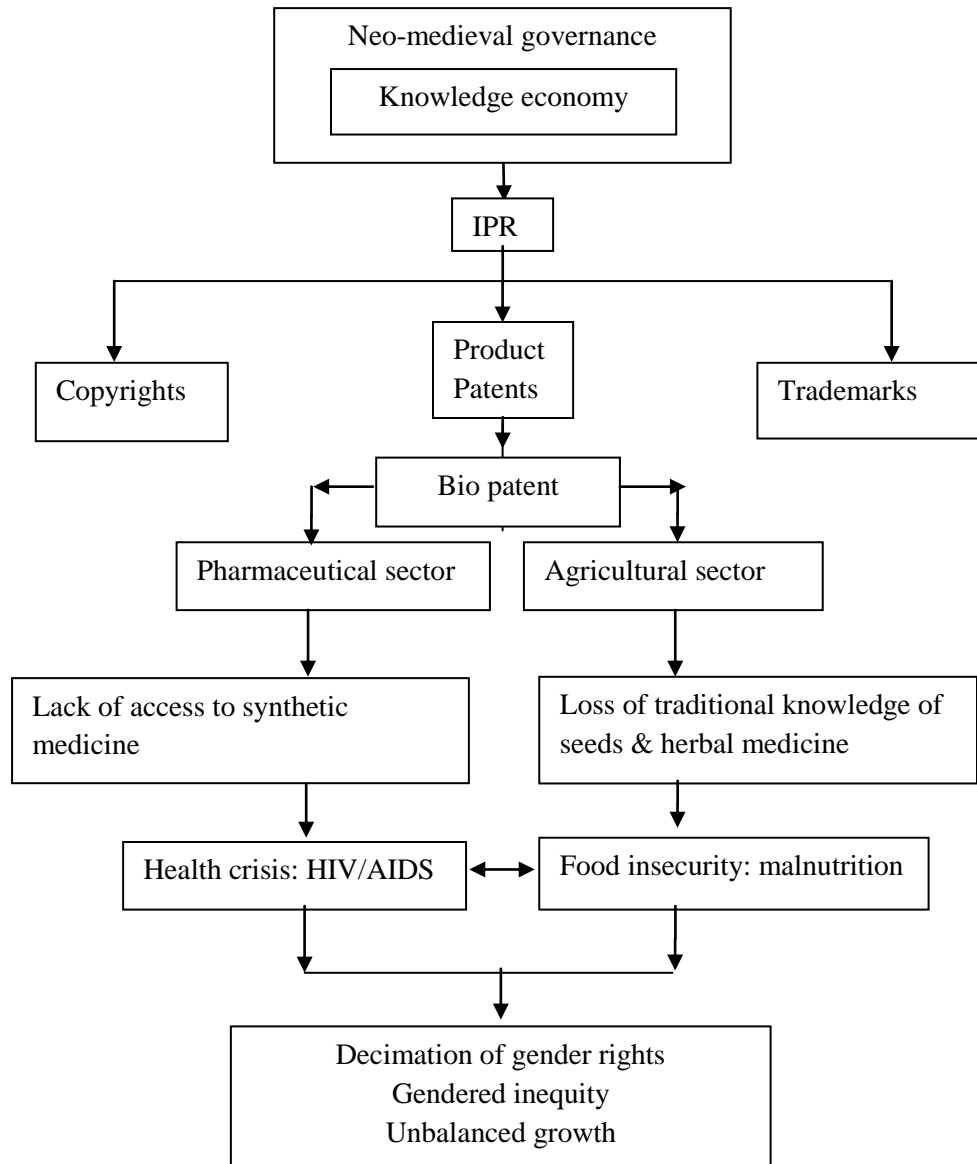
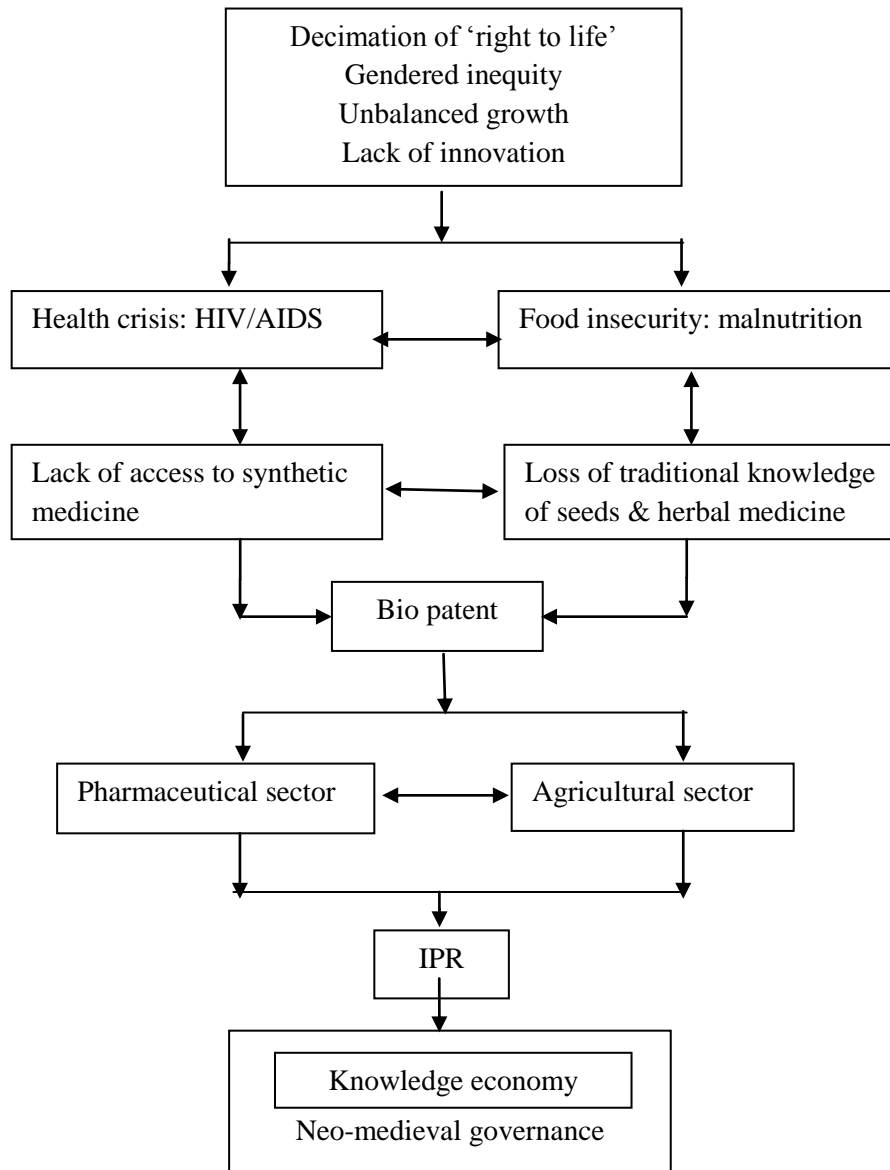


FIGURE 2



The Model (Figure 3)

The model is a descriptive attempt at mapping the key issues of the topic. We have knowledge economy impacting universal women's rights and sustainable development in terms of growth in innovation (both radical and incremental) and equity in terms of access to food and health. Due to knowledge economy's structure, there is a disjuncture between social and natural capital. So, what is natural and social capital?

Natural and Social Capital

Natural capital typically refers to the environmental stock or resources of Earth that provide goods-flows and ecological services required to support life (Pearce et al. 2000). On the other hand, social capital typically is defined as the features of social organization such as networks, norms, and social trust that facilitate coordination and cooperation for mutual benefit (Putnam 2004). I, however, go further than Putnam's (2004) definition by pointing out that human rights are also a basis for social capital (Chon 2006). An acknowledgement of this is critical for avoiding a 'Tragedy of the Commons,' where social and natural capital remains either under-utilized for innovation or over-exploited due to lack of social investment in them as important source of both growth and equity.

The 'Tragedy of the Commons' that leads to disjuncture between social and natural capital happens because there is a contradiction between the knowledge economy's framework of growth and policies of resource management of natural and social capital as sources of knowledge system. The deficiency of the dominant framework of growth – knowledge economy - is confirmed by Rooney (2005). For

Rooney (2005), the dominant knowledge discourse actually limits thought and action in relation to its central topic, knowledge. It results in a technocratic process that is frequently insensitive to its core humane mission. This is evident in the current forest policies and practices in India (Yadhav 2010).

Humane function of policies is lost because technocrats adopt discourses of expert knowledge (that is divorced from indigenous/local knowledge systems) and transform them into public policies. Such policies are based on instrumental/technical and functional orientation to knowledge. Technocratic orientation ignores cultural and societal knowledge's symbiotic relevance for natural sustainability. Knowledge economy, by ignoring this symbiosis, then reflects a partial understanding of what knowledge is and how knowledge systems work. Moreover, since knowledge is inherently political, the dominant paradigm is politically oriented towards the concerns of predominantly elite business and technology. This results in ignoring local concerns, without which, nature cannot be sustained.

As seen from the above description, governance has a critical impact on natural and social capital's dynamics and hence, is a critical part in moderating the dynamics of knowledge economy. Below, I outline the critical factors involved in neo-medieval governance.

Macro

From a macro/global perspective, the constructs of knowledge-economy and neo-medieval governance are basically representations of international ideological-systems. These idea systems are critical to understanding international and national policies of

growth implemented within international institutions and within states that are constitutive members of such international institutions. Such policies impact states' domestic constituencies – an important representative of which is women. In my dissertation, I will explore a specific growth policy that severely impacts women. This is the policy of TRIPS as implemented within the institutional dynamics of the liberal World Trade Organization (WTO). Within the TRIPS, it is critical to note the rationality of its institution in terms of changing patent protection from 'process' to 'product' patents and the current predominance of 'bio-patents' as engines of growth in the fields of health and food production in the global economy, as well as global push-backs that led to concessions, such as, compulsory licensing or the right to break patents in case of national health emergencies. I will also be looking at the growth of CSR in the international arena as an increasingly dominant idea that purports to demonstrate the growing ethicality of corporations trading within an avowed liberal system. I will also look at other critical international norms, such as, the REDD+ that has an impact on government activities.

Mezzo

From a more mezzo perspective, my topic deals with the specific manifestations of the macro dynamics within the context of domestic political dynamics of policy implementation within a single country – India. Exploration at the state level helps to demonstrate how state interests are formed through being members of the TRIPS and through bilateral and multilateral interactions with other states and corporations (who are supposed to adhere to the informal norms of CSR). The history of India's membership in

the TRIPS gives one a glimpse into the rationality for its state projects designed to produce rapid growth. These include creation of an internationally competitive, but domestically irrelevant, pharmaceutical industry by changing its humanitarian patent laws based on ‘process’ patents to product patents required by TRIPS. The irony is that India did this even while prompted into resisting the US and corporations’ push for TRIPS-plus measures in bilateral treaties due to transnational and civil society pressures. It also includes being one of the very few countries to allow for introduction of highly controversial GM crops in its highly marginalized agricultural sector. India’s pharmaceutical and biotech sectors opened to international competition is now defined by jobless growth of brownfield investments like mergers and takeovers (Banerji 2009). India’s agricultural sector has seen the emergence of needed greenfield investments of contract farming (Schutter et al. 2009). But, given the state of jobless growth there too and the controversy of GM biopatents, it seems to be going nowhere. On top of that, the rationale for all such policies – that it will ensure more of FDI has proved to be an illusion. There has also been a sharp drop in growth and FDI flows (Gupta 2011).

Hence, at the mezzo-level, I will be exploring the national policies undertaken by the Indian government in tune with the impact of the TRIPS (by looking at government ministerial policy archives and various online news archives and government and non-government Reports) to demonstrate how the state has been trying to discursively shift the focus of the impact of its neo-liberal policies by portraying a pro-poor image (Williams et al. 2011). Examples of such policies are the National Food Security Bill (Kotwal et al. 2011), National Rural Employment Guarantee Act (Shome 2011; Williams

et al. 2011), Forest Rights Act 2006 (Sarker 2011) endorsement of women's self-help groups for microcredit loans (Bali Swain and Varghese 2011), Integrated Child Development Services, and so on.

I will explore how various national policies have shaped the economic sector of biotechnology and the domino effect of biotech developments on the health and agricultural industries. The main focus here will be on the nature of such industries in terms of corporate sector's morality or CSR. This issue will be explored in terms of product development by the industries and the 'humane' costs of undertaking such product implementation by growers and consumers. I will also explore the kind of equity measures undertaken by the government to counter the severe drag on the economy from increasing inequality in the economy. Such measures typically include helping in creation and sustenance of indigenous community development projects, women self-help group projects, and so forth.

Micro

From a micro-perspective, my topic will seek to deal with the specific impacts of international and domestic policies on women's lives or gender welfare⁶ within two specific sub-states within India – the state of West-Bengal (a left-oriented and economically lagging state which has recently seen a change in guard after 34 years of communist rule) and the state of Maharashtra (a right-oriented and the most economically developed state).

⁶ Here, I will look at government and international institutions' data on human development measures such as life expectancy, decrease in poverty, and so on.

Rosser (2005) provides a comprehensive literature review on different feminist perspectives on gender welfare. What such a survey reveals is that as a whole, women's equity depends on achieving independent capabilities in both production (such as agriculture and traditional medicines) and consumption (such as medicines and food). The inability to provide for such equity represents a break in the social contract of egalitarian market economy and democracy. India's vaunted democracy 'seemingly' becomes a sham in the face of such empirical disjuncture with the ideal of equity that democracy represents. This disjuncture is exacerbated by contradictory priorities and policies of the state at the national level and its contradictory relations with the sub-states (both cooperative and conflicting) which impacts the sub-state's ability to deliver welfare results.

So far as women's health is concerned, I will seek to explore the impact of patents and the associated lack of access to medicine on a major 'unacknowledged' epidemic of India – HIV/AIDS. It is important here to point out that there is increasing social anomie in terms of disruption of stable family and community structures due to major diseases such as HIV/AIDS. There is increasing family-stigmatizing of women, increasing poverty among women and children and increasing susceptibility towards human trafficking (Kaessner 2010).

So far as access to food is concerned, I will be looking at failure in agricultural undertaking involving GM crops and its impact on male farmer suicides (Mukherjee 2007; UNESCAP 2009; Barling and Brooks 2011; Barling and Brooks 2010; Buczynski 2010) and increasing feminization of agriculture and the need for pooling resources, such

as land, through collectives (Swaminathan2010; Agarwal 2010). I will also be looking at overall failure in the agricultural industry as demonstrated by increasing food-insecurity and hunger (Menon et al. 2009), rising prices of foods in the context of increasing inflation and the impact of such factors on overall issues of sustainable income sources and access to food for women due to skewed national government priorities (Raman 2009; Gopinath 2008) I will look at the negative impact on indigenous communities as forests get denuded⁷ along with sources of livelihood. The focus throughout is on human-rights development and its consequential impact on sustainable growth and equity.

A critical ‘universal’ measure of equity is human ‘right to life’. In the context of gender equity within an emerging economy, such as India, the right to life can be explored in the context of access to health and medicine and in the context of access to food. In the former case, gender equity is impacted primarily from a consumer perspective while in the latter case, it is impacted from both producer and consumer perspective. In both situations however, a common factor impedes the right to life and distributional equity. This is the international institutional norm of the TRIPS and the generation of bio-patents associated with it. The severity of such impact is most felt among women in India. This is because of India’s conservative socio-political context that leads to subjugation of women’s voice and their right to property. It is also due to India’s current single-minded thrust on developing its economy at full throttle

⁷ With forests getting denuded, biodiversity is declining. According to Butchart et al. (2010), most indicators of biodiversity, such as species population trends, extinction risk, habitat extent and condition, and community composition are declining and those that reflect pressures on biodiversity, such as, resource composition, invasive alien species, nitrogen pollution, overexploitation, and climate change impacts are increasing.

irrespective of severe negative short-term and long-term spillover effects, such as environmental degradation, human trafficking, and so on, and their impact on gender welfare.

What my research will seek to reveal is that the ‘framing’ of policy issues in terms of growth in the face of rising inequality has not gone down too well with the common masses who suffer the effects of these policies. Hence, there are bottom-up counter-measures that act as empirical push-backs to non-egalitarian top-down policy impositions. Such counter-measures from the masses and NGOs striving to serve the causes of the masses tend to come from the civil sector which thrives in India. In exploring the civil society within India we can see how counter-movements to state-projects bring out the multiple fissures that resist undermining of human rights of women. In the case of India, such fissures are revealed through, for example, the emergence of severe extremist Maoist rebel movements across a significant portion of India (Das 2010) due to increasing clash over property rights between corporations and civilians and growing decimation of human rights in terms of not just right to life, but, also a ‘good life.’ India considers this phenomenon to be the greatest internal threat to national security, instead of a reflection of increasingly severe agrarian crisis (Lerche 2011).

The counter-measures that have arisen as a response to civil-society push-backs has ironically often led to the erosion of rights of women instead of helping them. This in turn, has led to the decimation of centuries of knowledge and innovation embedded in networks of social capital along with agro-biodiversity. This undermines the claims of the ‘knowledge economy’ – grounds of justification for individual IPR of TRIPS as a

modality for generating equity. This also leads to decimation of growth through innovation and disjuncture of social from natural capital due to the former's inability to nourish the latter. Such decimation can be seen from three unusual facts. First, India has the second-third largest AIDS victims globally. But, the government refuses to accept it as a national emergency. This prevents breaking patent protection of corporations, a crucial step to enable the availability of anti-retroviral drugs at affordable prices. Second, male farmer suicides have just reached the mark of 200,000, a sure indication of Durkheimian-style anomie. This breakdown in a fundamental institution of India – family structures (a site of repression and security) – creates for havoc in women's life and security. There is increasing concerns of decimation of biodiversity through bio-pollution of other wild crops that inadvertently get cross-pollinated from cultivated plots using GM seeds (Butchart et al. 2010). Such bio-pollution has threatened the preserve of herbal medicinal plants that is widely used by the poor due to lack of resources to buy synthetic drugs. Decimation of herbal/food crops has also led to increasing food insecurity. Along with rising inflation there has been increasing malnutrition among the poor. There is a growing consensus, particularly among civil society actors, such as, NGOs Navdanya, Prerana, Honey Bee, Chipko, SEWA, and others that this is due to increasing use of government-endorsed biotechnology in the agricultural sector. This has resulted in thwarting of the government's recent efforts to introduce Bt brinjal – another GM crop. Third, India's poverty and malnutrition (40%) – are worse than sub-Saharan Africa (Burke 2010)! However, the government does not consider these as issues of national security. Order through repression rather than through humanism seems to be the order of

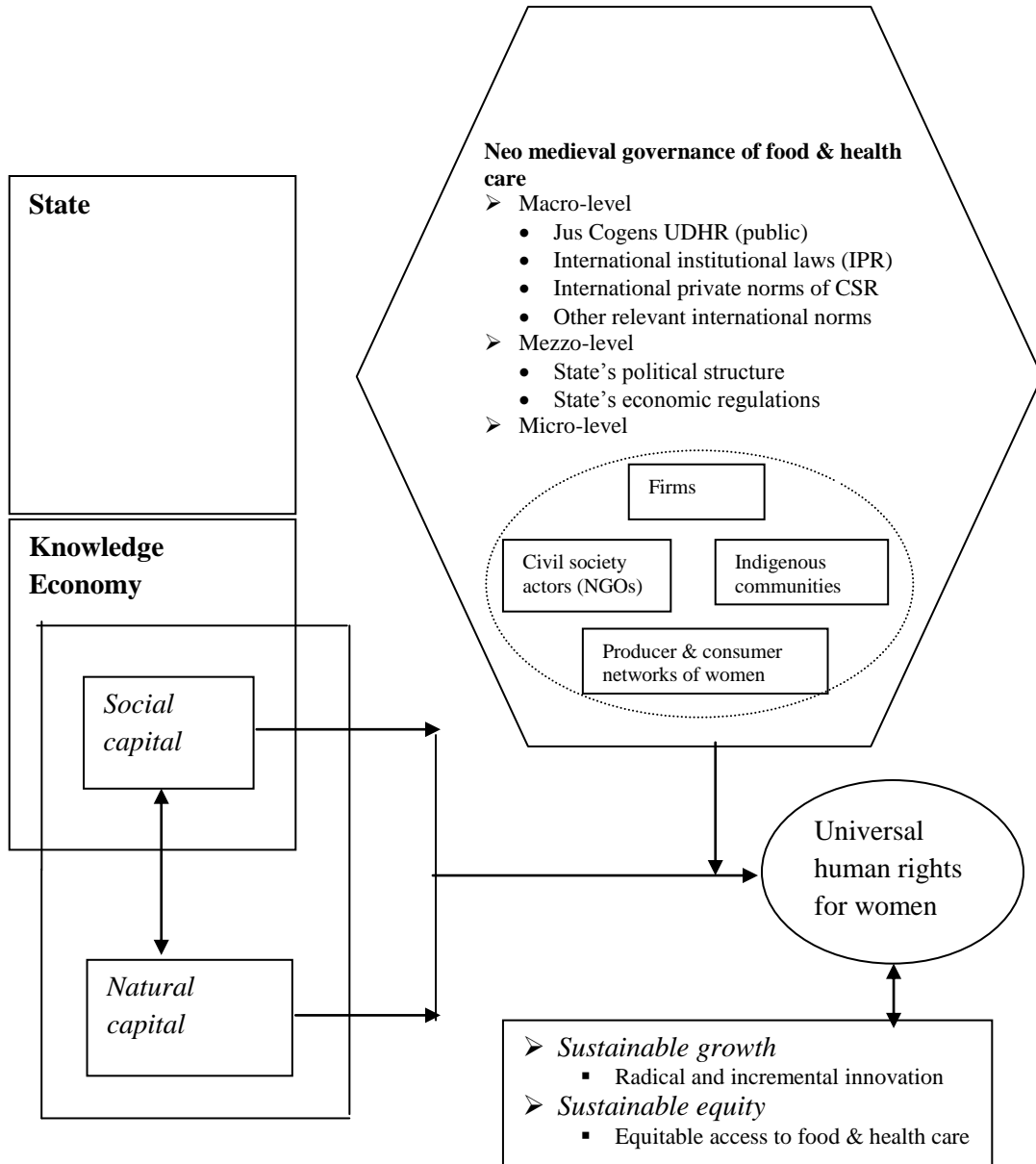
the day! This creates the puzzle of decimation of basic human needs of food and health despite a steadily growing economy and motivates my study.

What becomes clear from the above-outlined model is that ‘security’ – a critical aspect of international relations – is being redefined in the context of current flux in the global economy and consequently, the discourse and policies on human rights are being reshaped. Priorities of states are changing and so is global ideology in terms of what are the right instruments or policies for growth. No longer can states focus simply on nationalistic growth through creation of certain global champion corporations and on claims of sovereignty to protect such champions. Neither can they go on protecting corrupt corporations and hiding of massive political corruptions arising from shady dealings with corporations. Nor can states continue their human-rights abuse in the name of national security.

Economic degradation caused by multiple factors, including IPR, is increasingly tied up with civil-sector resistance movements that are being labeled as threats to national security. The increasing vocalists of the civil sector are undertaking resistant actions in various institutional forums and in the public arena (as seen in the recent anti-corruption peaceful protests across India led by the ex-independence-movement-activist Anna Hazare). They are forcing governments to change their definitions of national priorities. Increasingly questions are being raised as to the validity of patents. In this way, one can see how paths of social dynamics are affected not just from the macro to micro level, but also from micro to macro levels.

Given the above-mentioned background, let's now explore the constructs of gender, knowledge-economy, neo-medieval governance, CSR, and biotechnology and bio-patents in detail in order to understand a feminist critique of them and the necessity to put human rights above and beyond other considerations in order to deliver sustainable growth and equity.

FIGURE 3



Gender Issues in the Context of India

Why is understanding gender rights (Hafner-Burton and Pollack 2002) critical for understanding the current dynamics of knowledge-economy and neo-medieval governance? Gender refers to socially constructed identities, roles, and status and influences the allocation of power, entitlements, opportunities, and prestige to males and females. Gender issues are inevitably tied to discrimination, oppression, and marginalization (Kilby and Scholz 2011) and hence, impacts the formation of human capital (Jensen 2010). This prevents women from benefiting equitably from the resources available within the family, the community, the state, and society. The ideology of patriarchy rationalizes the injustice against women by portraying them as dependent and incapable (Joshi 2011; Satyavathi et al. 2010; Currie and Vernoooy 2010; Singh 2009; Ciotti 2009).

Given this pervasive gender discrimination, several authors highlight the emergence of ‘transnational’ gender movements as movements of resistance against power, and demand for justice and human rights (Deepak 2011; Dutt 2010) in the context of current forms of socio-eco-political globalization. Not only that, critiques point out that such globalization is marked by huge ‘industrialization of biology’ – a critical basis of life – in a highly reductionist, short-term oriented manner that ignores systemic issues or long-term consequences/impact of rapidly evolving industrial-grade biotechnology on human beings (Wellstead 2011; Gandhi 2010; Dongre and Deshmukh 2010).

Gender issues in India are complicated in the context of cross-cutting issues of gender, caste, class and ethnicity (Bannerjee 2010; Nikolopoulou and Mirbagheri 2010; Ahmed 2010, Mann et al. 2010; Krishna 2009; Menon, 2009). This can be seen in the current ‘unacknowledged’ national health scourge of HIV/AIDS (Verma et al. 2010; Chakrapani et al. 2010; Karmakar et al. 2011; Ranga et al. 2010; Reed et al. 2010) and associated diseases such as Tuberculosis (Lal et al. 2011), malaria (Chaudhry 2006; Sharma 2009) and so on, among sex -workers and ‘other’ women of India from different castes (Menon 2009).

In India tribal women who depend heavily on use of traditional medicines available through non-wood forest products, not just for common illness, but, also for illnesses that relate specifically to women, such as pregnancy, menstruation, cervix cancer, etc. (Hussain and Hore, 2007) are being deprived of their knowledge due to biopiracy. Knowledge of tribal women is predominantly of phenotype (as opposed to genotype which focuses on alleles, nucleotids etc., phenotype focuses on adaptive traits, reproductive performance, appearance etc.) [Ramesha 2011]. Such knowledge can be used to develop women’s entrepreneurship (Ray and Ray 2011, Dasgupta et al. 2006) especially for the poor and the marginalized (Sati and Juyal 2008; Torri 2011). However, with the advent of a critical arm of TRIPS - biotechnology that is used to identify land plants and animals and aquatic animals and plants’ medicinal, cosmetic and food values – such traditional knowledge of women has become endangered due to ‘uncompensated commercial bio-prospecting.’ Bio-prospecting is undertaken for the purpose of conversion of traditional knowledge through biotechnology.

In India, misappropriation of knowledge goes hand in hand with misappropriation of land. This increases poverty and the majority of poverty is to be found in rural areas where land grab is on the rise. Indian women are largely confined to unpaid work at home or in field, and have some income through casual labor. In India, according to National Sample Survey Organization report on rural female work participation, in the primary sector employment of women in agriculture declined from 87.5% in 1983 to 85.4% in 2004-5. However, such statistics can be dubious. When governance institutions are not pro-poor or gender sensitive, even estimations of real inequality and poverty done in national surveys falls far short of reality (Patnaik 2010).

In general, government policies in India tend not to be gender sensitive and hence, fail to look at systemic impacts of environmental issues on gender, inequity and poverty, particularly in the rural areas, where majority of the Indian population lives (Sarkar 2010; Virmani 2011).⁸ This is despite the fact that studies show that gender-sensitive planning for rural community driven forest management programs is a favorable way to increase women's income and reduce the time women spend searching for forest produce and completing ancillary tasks, such as processing (Das 2011). In addition, when distress-

⁸ According to Virmani (2011), poorer India is primarily agricultural. The poor constitute more than 50% of the population but accounts for only 15% of the economy. The agricultural sector, in recent years, has been growing only at 3% as compared to average annual rate of 9%. An exponential price rise, due to inflation, of 17% in January, 2011, compared to the same period in 2010, for food staples that include eggs, fruits, milk and onions, has severely crippled the poor's survival options. When one considers the fact that tribal populations use milk, eggs and fruits as part of their traditional medicines, the only source of medicines they have as per Kulkarni and Deshpande (2011), such price rise becomes an even graver concern. Such price rise and its impact on women children have to be understood in the context of current financial crisis in the global arena and in India (Dev, 2011). There is difference in the impact of malnutrition on women across caste and religious lines. In comparison to SC/ST, OBCs and Muslims, the advanced castes' women are better off across all states in India. For advanced castes, the difference between Maharashtra and West Bengal is 34.5% and 31.5% respectively.

linked out-migration is curtailed due to local development process there emerges growing evidence of women's empowerment and a broad range of health benefits including reduced HIV risk (Brooks and Loevinsohn 2011).

The lack of understanding among the governing elite of the moderating impact of good institutional arrangements of local participation (Andersson and Agrawal 2011), leads to failure of grass-root level development. The result of lack of grassroots level participation can be seen in the fact that the government generally ignores generations of farmers' local experiential knowledge developed through trials and experimentation (Brooks and Loevinsohn 2011). Due to lack of integration of traditional knowledge into policy frameworks the government has blithely unleashed the use of Bt seeds in agriculture.

Irrespective of ambivalence in biotech use, the lack of voice in how biotechnology is used and the burden of its depressing consequences fall on women. This once again brings in the issue of engendering governance. As a counter-balance to such problems one can point out the growing influence of NGOs (Berlan and Shiffman 2011) both transnational and national among mainstream and tribal people (Nanjunda and Dinesha 2011). At the transnational level, there are multiple NGOs, such as, Agriculture Cooperative Development (Clark 2011) working for food security, and Medicine Sans Frontier working for access to medicine for the poor. At the national level there are NGOs such as CINI (www.cini-india.org) working to provide nutrition and health to women and children. CINI has also CINI Asha in the sub-state of West Bengal that helps children of sex-workers to increase the awareness of HIV/AIDS. As an NGO, Asha

independently deals with the issue of human trafficking, particularly child trafficking, in Mumbai, Maharashtra (Pink, 2010).

Knowledge Economy

With trade-globalization Southern developing nations are increasingly following knowledge economy as a 'normative' model of growth to catch up with the Northern leaders (Paul and Mukhopadhyay 2010). Before expanding on the thesis of the impact of knowledge economy, it is critical to have a background understanding of the assumptions behind knowledge economy.

The model of knowledge economy is propounded by neoliberal economists who favor the operation of market economy over hierarchical state coordination for provision of public services. This is because they consider the state to be inefficient and corrupt. In contrast, market provides for individual freedom through unfettered competition and aligns private and social cost (Coleman 2013). The neoliberals overlook the fact that the state is an embodiment of citizenship with commitment to collective interests. Neoliberals prescribe the complete retrenchment of state from provision of public services. They view privatization and deregulation to be the emerging norm. State legitimacy is restricted to a form of sovereignty limited to guaranteeing economic activity (Lemke 2001).

Neoliberals extend the market into the political arena thereby creating for 'marketization of the state' (Olssen 2006: 219). The public sector becomes economized to reflect market principles and mechanisms. Collective or public responsibilities of achieving welfare of the society, particularly for those who are structurally disadvantaged

is put on a back burner. Individuals are thought to be autonomous subjects functioning on subjective voluntary calculations and hence, their choice in terms of ability to purchase a product is a decisive 'democratic vote' about their preferences. Such preferences are based on rationality of profit and loss or cost and benefit and the responsibility for their choices are fully attributable to them. In short, all structural barriers of power are discounted and the individual is made completely responsible for his or her actions.

In the model of a knowledge economy, the sustainable characteristics of knowledge are emphasized. However, knowledge is seen as individualized, utilitarian and commodifiable and hence, only codifiable knowledge is valued. This discounts a whole stream of non-codifiable traditional knowledge. More importantly, the model presumes a uniform distribution of 'modern, codifiable' knowledge, and hence, a pre-designated state of 'formal' equity.

However, the model of knowledge-economy is not uniformly egalitarian. The North with its technologically advanced value-added, finished-goods is far ahead than Southern countries. Finished goods represent highly developed innovation knowledge processes. Such innovation has been sought to be safeguarded through patents that have been inscribed in international treaty systems developed within the purview of international trade bodies, such as, the WTO. As Sell (2003) argues, advanced state in cahoots with their corporations instituted a regime of patents due to heavy protectionist lobbying of their corporate sector who wanted to ensure that any competition that undermined their advantage was blocked (Cohen 2008) and developing states have been

left with very little economic policy leverage for distributional issues (Khan and Patomaki 2010).

The key argument for protection through patents was made by the powerful US PhRMA – pharmaceutical industry marketing association. They argued that reverse engineering of drugs done by generic companies in developing economies was basically stealing of innovations created by them. The protection provided to such generic drugs through ‘process’ patents by developing countries was a disincentive to innovation. Hence, all innovations should be ‘product patents.’

The US as the hegemonic nation-state convinced all other major developed countries to agree on the position that ‘standardized’ product patents are critical for growth and hence, their protection is vital for stability and ‘fairness’ in the international trading system. It also actively used sticks and carrots of non-access or access to its huge consumer market for developing country goods, particularly agricultural products, in order to force other countries to agree to this position. The result was the institution of the TRIPS in the WTO. This signified the emergence of ‘private power leading to public law’ (Sell 2003).

The emergence of internationally recognized private rules of CSR, roughly around the same time as the development of the TRIPS, was also applauded as a measure of the benign nature of the developed world and international corporations that stridently argued for patents. It was supposedly an indication of their faith in and adherence to a system of ‘rule of law.’

The center-piece of knowledge economy model then is ‘legal patents’ that helps to commodify and privatize scientific knowledge production (Baskaran and Boden 2006). This helps to garner increasing rates of return or provide accumulation of wealth for corporations (Herstatt et al. 2008).

IPR provides incentives for innovation for individuals too; helps generate proactive productive activity; and builds human capital by transferring labor from subsistence activities to efficient modern knowledge-based activities (Dahlman and Utz 2005). Such a transition also enables the flow of FDI that seek to take advantage of a well-developed institutional atmosphere where patent rights are legally protected.

The above-outlined emergent consensus regarding human capital, knowledge and growth among developed countries in the WTO was not shared by developing and emerging countries. Though party to the TRIPS treaty, developing and emerging countries were predominantly ‘coerced’ into it and had limited leverage in its construction and hence, feel that it was not a legitimate process of consensus-building. Consequently, there has been an ongoing battle, right from the creation of TRIPS, to prioritize human rights and development in the TRIPS (Sell 2003; Sell 2007; Sell and Prakash 2004; May 2006; The Corner House 2004).

Standardized IPR is a powerful institutional force because it is a state-sponsored monopoly power of corporations that far exceed the necessity for incentivizing innovation. IPR helps to derive above-normal profits from advantages that are sheltered from imitation and consequent market competition (Levy 2008). Patents then act as barriers to ‘free and fair’ trade. IPR, however, can be useful, if it is applied in a nuanced

manner with consideration of local social dynamics and history (Baskaran and Boden 2008).

In the absence of protection of patents of traditional knowledge bio-piracy is increasing. The way this happens is through ‘bio-prospecting’ of healing indigenous plants by corporate appointed scientists. The local scientists working within the purview and incentive structure of a MNC use their local knowledge to network and tap into the knowledge of local women and indigenous communities without these groups being aware of what they are giving away in terms of proprietary rights. Once, a ‘healing’ plant is identified, the healing active ingredient is decoded through genome deconstruction by the scientists (www.grain.org). This process is, ironically, similar to reverse engineering of drugs that used to be undertaken under the banner of process patents. This reveals the hypocrisy of so called CSR. The situation is further worsened by the fact that there are no significant attempts by businesses to share the benefits of such knowledge with the original knowledge preservers and developers of such healing systems.

Given this overall background, many have asserted that the current form of knowledge economy shows modern forms of accumulation of surplus value along with primitive accumulation (Brass 2011) of knowledge through dispossession of primary owners in the South which is rich in traditional knowledge (Gibb 2007; Zeller 2008; Brand and Gorg 2008; Tyfield 2008).

Neo-medieval Governance

Friedrichs (2001) conceptualizes ‘medievalism’ as ‘a system of overlapping authority and multiple loyalty held together by a duality of competing universalistic

claims' (486) of the Empire and the Church. In an analogous way, the post-international world can be seen as being characterized by a complicated web of societal identities that is held together by the coexistence of two hegemonic projects of organizational logics and their antagonistic claims in the inter-political order - the Nation-State system defined by sovereignty and the Transnational Market Economy defined by efficiency of allocation.

Friedrichs sees this 'neo-medieval' concept as a 'heuristic device' that helps to comprehend the current reality of economics, politics and society better by surpassing three limitations of IR. These limitations are the current economic thesis of globalization that sees the state withering away due to forces of technology and economics; the discourse of fragmentation that sees the state as withering due to the emergence of cleavages along cultural and religious line; and the traditional state-centric Westphalian approach that sees the state as an absolute realm of unquestioned unified sovereign authority.

For Friedrichs (2001), neo-medievalism is a meta-narrative of alternatives to the above-mentioned limitations of IR without claims to falsifiability or value-neutrality. According to him, it helps to generate a historical narrative that can map the current multi-faceted genealogy of global reality and is a good entry point into the study of free trade and its impact on human rights.

For Friedrichs (2001), at world polity level, there are some diffuse general models that are constitutive of how the political functionaries in national and international bureaucracies, international NGOs supported by a transnational class of knowledge-based

intellectuals or epistemic communities engage in ‘construction’ of state formation and policy formulation. This helps to define the national interests of states and confer legitimacy to state-projects. Similarly, at the level of transnational market economy, corporations competing and cooperating on a bilateral and multilateral level, have gained power over production and finance on the global level and are thus active in the constitution of the concept of efficacy. This emergence of a ‘transnational capitalist class of bankers, businessmen, scientists, media tycoons, and so on’ (Friedrichs 2001: 488), has led to the unraveling of the embedded liberalism of the post WWII period, as both ‘nation-states and transnational market forces raise the right to mutually exclusive claims for determining the rules of the game in the world political process’ (Friedrichs 2001: 488).

The right to define the form and substantive content of growth and justice and the modes of achieving them is the center-piece of the struggle between the two main constituents of neo-medieval governance – the state and the market. This struggle between universalistic claims and particularistic aims create for significant disjunctures in the ‘messy’ empirical reality.

On exploration of international norms, like the TRIPS, CSR and Sovereignty, we find out how competing claims of state and market play out in terms of investment rules of FDI and human rights in the multilateral forum of the WTO (Sell 2003). We can also find out how such claims reveal the paradoxical effects of constant play of power, self-interest and norms of appropriateness. These factors can be harnessed for both the efficacy of the rule of law of universal human rights for nation-state citizens (by

international movements like Doctors without Borders, Greenpeace, Food First, and so on,) and creation of investment rules that are unjustified on the ground of those very rules of law but justifiable in the context of a market economy (by corporations with the help of powerful states, like the US)⁹.

We can also see how the intertwining of the two rules of law – investment and human rights - in this contest creates for paradoxical effects (Wouters and Hachez 2009; Schutter et al. 2009). This is seen when powerful states, like the US, has to defend the human rights of its citizens by curtailing corporate claim to human rights within its own boundaries. Given the US' hegemonic position, this sets up legal precedents internationally and undermines the US' efforts to push through bilateral treaties, with other countries, that are designed to further its national interests of growth through its corporations by prioritizing investors' rights over citizens' human rights.¹⁰ The irony is manifest given that without the US there really would not have been hegemonic leadership in the passing of the law of Universal Declaration of Human Rights (UDHR) in the first place. Without such a law in place, the epistemic communities of lawyers, academic experts, and civil-society activists would not have been able to argue for the upholding of this public law as the supreme law (*jus cogens*) over and above all other forms of international laws whether public or private. With this conundrum in mind let us

⁹ This justifies Friedrichs (2001) concern that empirically, economic reasoning is taking precedence over politics and society.

¹⁰ Such bilateral treaties typically seek to undermine multilateral agreements where the US had to concede on critical human rights grounds (Helfer and Austin 2011).

first look at the the kind of state that India is and then the issue of CSR and the controversial issue of biotechnology.

So What Kind of State is the Indian State?

To understand the narrative that evolves in the following chapters that outline the dynamics of knowledge economy and neo-medieval governance, and the Indian government's failure to deliver welfare, it is critical to understand the kind of state India represents. Neoliberal economists dis-embed the economy from politics of governance and from its social context when they postulate causality between the independent variable the knowledge economy and the dependent variable economic growth and trickle-down equity. Neo-medieval governance is an intervening variable defined by varying authorities of state, caste and patriarchy. Such intervention by the empirical reality of neo-medieval governance distorts any postulated theoretical relationship between growth and equity. It is in this context that the failure of the Indian state to deliver welfare and human rights needs to be understood. So, within neo-medieval governance, what kind of state is the Indian state?

Given that the GOI demonstrates such poor ability to deliver welfare to its people, the question that arises is what kind of state is India and why does it fail so miserably? According to Pritchett (2009), India is a flailing state. The 'head' of the Indian government is so strong that it is in teetering control of the mountain of red tape and bureaucracy so that there seems to be a functional mirage of programs 'functioning' even though in reality outcomes are hopeless. India is a nation-state in which institutions at the national and even in some sub-national states remain sound and functional but the 'head'

of the nation-state is no longer reliably connected via nerves and sinews to its own limbs. In short, there is lack of an effective state with strong capability to implement programs and policies at the ground level.

Pritchett (2009) points to the number-crunching fantasia created by the Indian government reports, commissions, documents produced by official agencies (including those produced by the foreign agencies working with the government). The Indian Administrative Service has a significant number of spectacularly intelligent and competent top-tier professionals. India has some world-class institutions such as the Indian Institute of Technology, All India Institute of Medical Sciences, and so on that generate typical knowledge economy workers such as engineers and doctors. Between this mirage and the spectacular manipulation efforts of the bureaucracy a wonderful normative 'myth' of modernization about India has emerged. In this myth, India is a regular modern state with a growing economy, democratic politics, a functional civil service, and is making progress on social issues. But, India is beleaguered with a critical paradox. It is the paradox of a growing economy with spectacular failure in delivery of nearly every routine public service, such as police, tax collection, education, health, power and water supply, and so on. On top of that there has been suspension or arbitrary application of the rule of law and widespread violation of human rights as is apparent from the dealing of Naxalite violence in India.

According to Pritchett (2009), the essence of administrative modernism which is that state bureaucrats should carry out their prescribed functions according to the organizational processes and procedures and irrespective of politics, personal

characteristics, or pecuniary motivations does happen in India. But, for the large part among civil service in India, this essence has ceased to be the norm. Instead, the civil service from top to bottom has become politicized, personalized and corrupted. Hence, India's top-down bureaucratic delivery of services become highly problematic. In a recent report delivered by Hong Kong based Political and Economic Risk Consultancy, India was ranked as having the worst bureaucracy in Asia. On a scale of 1-10, with 10 being the worst, India received a score of 9.21 (bbc.co.uk). Civil society and human rights groups allege that the bureaucracy is barely held responsible for wrong decisions or incompetence, absenteeism, indifference and corruption. They cannot be fired for wrongdoing because they are permanent staff who belongs to the national or state level civil services. Even though the GOI does not lack in the rhetoric of democratic devolution and participatory development, it also sees itself as a strongly sovereign unified state that is in control of implementation of health care through community participation (John et al., 2011, Welshhoff, 2006). Caught between these two tendencies - top down implementation and community participation - programs and policies do not get properly implemented. Hence, reforms initiated and championed by ethically good civil service officer with some latitude and autonomy and power at the local level or even by effective NGOs often fail to bring about sustainable positive outcomes. There is failure of a broad political buy-in of such local level efforts.

Indian bureaucracy is an inheritance from the colonial period. The structure was designed to maintain order and extract revenues and not deliver developmental service provisions. Since bureaucracy did not emerge organically from the local cultural base and

was built on an authoritarian base, it can hardly be expected to deliver on a universal transformative egalitarian ideology of modernization. History and culture thus stands solidly in the face of efforts to transform society by market welfare.

India is a solid case of neo-medieval governance. According to Pritchett (2009), contra modern expectations that with penetration of market economy, an ‘imagined community’ will emerge that will overcome ascription-based religious and regional sentiments and identities and will forge a feeling of national solidarity, the reality of a vastly complex society of India defies all expectations. Equality of citizens based on social legitimacy that overcomes vertical allegiances to patrons, vertical entitlements to superior treatment, and also horizontal attachments to treat one’s sub-group (based on caste, religion, language and political persuasion) as the modus-operandi of everyday life is still a far dream in India. The deeply fragmented nature of India means that in local village council meetings conducted to discuss and ratify various issues there is predominance of identity claims and lack of a common public spirit. At the national and local levels, the elite instead of trying to reform the system from inside through voice and action have chosen escapist self-coping mechanisms to deal with the poor nature of service-delivery. For example, they use their pecuniary abilities to create local mini-infrastructures that serve them, such as private schools for education, private clinics for health, private vendors for water utilities, and so on.

According to Welshhoff (2006), gender health outcomes in India are depressing because policy makers cannot anticipate obstacles to policy issues as they formulate policies. This is because they really do not get or seek to get primary information from

the local populace about the structural barriers arising from the local dynamics of geography or ecology, socio-cultural, economic and power issues that prevent accountability and transparency. They fail to undertake constant processes of monitoring. When local level dynamics of gender justice is overlooked due to lack of such information and appropriate policy measures, community participation may yield negative outcomes despite the positive potentials that such an orientation can deliver. But, most critically, a major part of the problem of macro-policy failure lies in the policy-makers lack of political will to implement far-reaching political reforms.

Deshpande (2007) confirms the viewpoints of the above mentioned authors. According to the author, material deprivation or advantage of social groups in India reflects the underlying processes of discrimination or nepotism. Contra neo-liberal expectations social identities very much matter in the supposedly asocial dynamics of the market. In addition to 'premarket' discrimination such as education, nutrition, and certain health outcomes, market exacerbates caste and gender discrimination. The author develops a gender-caste development index (GCDI) based on variables of land ownership, education, occupation, livestock and consumer durables to see how India's liberalization since 1991 has impacted women of different castes. Based on comparison of NFHS 1992-93 and 1998-99 data she comes to the conclusion that in terms of GCDI, across all states, liberalization has disproportionately benefitted the elite women within the upper-caste women (as seen in their higher concentrations in higher occupations) and made the SC and ST women worse off. In terms of the GCDI, OBCs lag behind upper-

caste women and SCs lag behind OBCs. On top of that poverty continues to be a challenge.

Deshpande's (2007) study found that in the NFHS datasets, the women's 'not working' response has increased among marginalized women. This reflected that in India, since constraints on women's public visibility rise with a rise in the caste status, working for wages was seen as a mark of low status and hence, the fact that one was doing so was often denied. In 1998-99, at the all-India level, 53.65% of SC and 36.8% of ST women self-reported themselves to be not working. Thus contra knowledge economy's predictions, growth and economic prosperity does not lead to gender liberation, instead it takes women out of the workforce as work is seen as demeaning of social status.

Deshpande (2007) notes that while politically there have been increasing caste influence, such influence has not necessarily transformed into economic affluence. Upper castes continue to be the economic elite in India. The other distinguishing characteristic of the GCDI was its regional variation. Lopsided regional development since the 1990s liberalization can be attributed to a certain extent to the legacy of the British rule in India. While agricultural growth varied due to climatic factors, industrial growth was concentrated in the richer and more accessible regions. Post-independence, some attempts were made by organizations, such as the Finance Commission, to use the instrument of federal transfers to states to alleviate regional imbalances. However, post-liberalization, with the declining role of the government in the economy, conscious interventions to reduce regional imbalances had declined. This had significantly contributed to regional

inequalities. The GCDI confirmed that in the early years of liberalization, i.e., 1992-99, the gender-caste gaps had not started to close. Thus, the failure to understand the 'neo-medieval' nature of internal governance continues to bog the Indian state from making healthy progress in provision of public services for women.

According to Deshpande (2007) since caste and gender oppression are rooted in antiquated tradition, there tends to be a strong belief that in opening the economy and its integration with the world economy, entry of foreign MNCs that are outside the framework of this tradition, and greater penetration of the market can serve as catalysts for change. 'Foreign' market forces were expected to be more likely to be guided by the expediency of profit-maximization than to be mired by local constraints. Hence, they were expected to serve as 'liberating' influences. But, in India modernity and discrimination continue to coexist. In fact, as under the British rule, current foreign interests may have found it easier to adjust to and hence, perpetuate preexisting patterns of inequity rather than seeking to break them. Thus, neo-medieval governance skews the relationship between economic growth and equity.

Corporate Social Responsibility

Along with the state of India, it is critical to understand what CSR means in terms of governance of developmental activities. Social responsibility begins where the domain of formal law ends. Graham and Woods (2006) point out that corporations are informally expected to implement global public policies efficiently and effectively because of their organizational expertise. According to Flanagan and Whiteman (2007) four basic responsibilities - economic, legal, ethical, and philanthropic - can be linked to key

corporate social performance processes such as environmental assessment, stakeholder and issue management.

According to Chin et al. (2013), firms with CEOs who have a liberal disposition are more likely to be concerned with human rights, planned social change, environment, economic equality and control over markets. In contrast firms with CEOs who have a conservative orientation, value individualism, property rights, free markets, efficiency, status quo and business needs. All ideologies aside, as Flanagan and Whiteman (2007) point out, a major weakness of CSR is the lack of meaningful participation by external stakeholders in policy development and lack of embedded procedures of monitoring and concrete sanctioning within its code of conduct.

CSR laws being voluntary are a way of avoiding the economic costs of governmental regulation (Lawrence and Weber, 2013). Being voluntary they are expected to be guidelines for self-governance and hence, to generate more social commitment on the part of the corporations. However, as I will point out in my thesis, CSR as is propounded by the neoliberals does not provide for market corrections. It is with this thought in mind let's look at the controversial issue of biotechnology.

Biotechnology: The Contested Realm of Investment, Patents and Human Rights

Why is there controversy over biotechnology and GM and what are the governance implications? There are two distinct ways of looking at biotechnology – one as a continuous process of human intervention in nature and one as a radical discontinuity in the manner of that intervention. Continuous vision looks at millennial developments, such as, advances involved in selection and hybridization during the process of crop

production and extraction of medicinal qualities from plants and minerals. In governance of such advancements consumers had more of a say in what was grown than producers.

In modern age there has occurred a disjuncture between producers of technology and the consumers of those technological products. Now the 'technical' elite has become the producers with backing from the technocrats and business elites while majority of urban consumers and farm producers who continue to live on older versions of experimenting with nature have been left out of the loop of governance based on private-interest science.

Due to this disjuncture, there is a constant struggle over the normative ideals of costs and benefits of biotechnology, the very morality of undertaking such technology, granting of IPR to such technology and the impact on overall human rights and sustainability of human life. The Precautionary 'principle' of ethics that has emerged in the struggle over normative ideals is based on the assumption that scientific uncertainty is not a bar to preventive regulatory action and decision-makers are better off erring on the side of caution when dealing with issues of harm.

The critiques of the precautionary approach dismiss common people's concern about safety of the technology in terms of health and environment. They go beyond the risk factors of laboratory, enhanced by 'precautionists', to point out that the 'natural' laboratory is equally risky and non-predictive and hence, there is room for the 'discontinuous vision' of biotechnology where human engineering can be given historical consideration. Consequentially, legal IPR are increasingly being granted to 'discoveries'

in nature (such as genes) rather than simply to industrial innovations that proceed from inventions (Mukhopadhyay and Paul 2011).

Biotechnology has the potential for good outcomes (Swaminatahn 2010), but, currently, in the rush for quick profits and illegal manner of claiming patents (Saha and Bhattacharya 2011), the technology is proving to be a curse that is preventing the insurance of development through protection of human rights (Helfer and Austin 2011). This is evident in the fact that ancient knowledge is being illegally stolen through bio-prospecting, and being 'legally' patented without compensation by multinationals (Demunshi and Chugh 2010).

Commodification of scientific knowledge in knowledge economy and its flagship biotechnology sector has thus created a huge societal chasm in terms of human, social and natural capital, whose resonance is felt by one of the most vulnerable section of the society - women. Hence, there has been increasing critique of the knowledge-economy driven IPR and neo-medieval form of governance of biopatents, especially by feminists.

Feminist Critique of IPR

IPR stands squarely in the liberal tradition of contractual rights. It emphasizes individual liberty - 'property in the person' - within contract-based democracy and economics, where individuals' consent is taken for granted. However, feminist theorists, like Ackerly (2008), point out that women's subordination in both public and private domain makes women second-class citizens who are unable to make informed choices and whose notion of human rights are not heard. This is due to lack of means or access to conditions necessary to make the choices effective and their political voice to be

prominent. Ackerly (2008) points out that social contract discourses by projecting a non-contested universal consensus of rights as a ‘knowledge system’, thus imposes an epistemological subordination. This knowledge process through ossification of established traditions, prevents a constant reexamination and modification of social practices and institutions.

Due to such structural constraints, in tune with John Rawls (1999), one of the most prominent proponents of social contract theories, Ackerly (2008) calls for a ‘non-ideal’ or empirical theory of rights. This means recognizing the fact that the conditions necessary for bringing about all outcomes that a fully articulated theory requires is severely lacking empirically. Hence, questions of contract cannot be considered to be morally settled prior to a genuine political engagement that depends on the justice of the context of such action.

To achieve gendered justice, states can help by creating enabling conditions. What is also needed is the informal operandi of individual and group practices that seek to correct injustices. Hence, social capitals of networks based on trust are critical. This prevents the emergence of a system where people are complicit with established ways of doing things (Ackerly, 2008).

According to Burk (2006), IPR rewards certain technological advancements and penalizes others. There emerges a mind and body dualism in patents as only mental work is valued and not physical work. As is typical of dualism, mental work is thought to be masculine and superior to physical work which is designated as feminine. Women’s labor

is relegated to menial work, mainly domestic, and becomes invisible. Such labor tends to be unrewarded.

Burk (2006) contends that patents divide ‘human activity from “natural” or “discovered” subject matter, distancing inventive and creative work from the environment in which it necessarily occurs’ (202). The former is given value while the latter is subjected to subordination. Property is designated to certain activities and materials while other types are labelled as common property and thus left open for exploitation. Moreover, high technology is valued while low technology inventions are ignored. As a result women’s discoveries embedded in nature is discounted. There occurs a bifurcation of natural and social capital. Thus, women’s knowledge of crude extracts of plants as solutions to illness is ignored for patents while identifying active compounds within such extracts leads to patents even if it means biopiracy of such knowledge.

What becomes apparent from the above survey is that feminist critiques call for better leveraging of existing neo-medieval governance in its multi-layered form to correct for both macro and micro political exploitative hierarchies. The multi-nodal point of contestation in the global arena is reinforced by Shaffer (2008) who points out that the WTO’s legitimacy is under question. According to Shaffer (2008), the WTO’s

judicial interpretive choices allocate institutional authority for addressing policy concerns to alternative institutional processes, including the market, political and administrative processes, and courts, at different levels of social organization, from the local to the global. These choices are particularly important in a pluralist world involving constituencies with different interests, priorities, perceptions and abilities to be heard (Shaffer 2008: 1).

One clue for the increasing avoidance/divergence of state activities from the arena of the WTO, which acts as a source of integrating trade activities with the punitive ability to impose sanctions, is provided by Capling (2011). According to Capling (2011,) in the last decade there has been a rise of bilateral Preferential Trade Agreements (PTA) between the North and the South that is given pre-eminence by developed and developing states over and above multilateralism, as embodied by the WTO. The reason for this is not so that developed country MNCs can have better access so that they can export their goods to developing country markets. It is primarily to ensure opportunities for FDI in manufacturing and services. Firms in rich countries seek to invest in developing countries where they can take advantage of lower labor costs and produce goods more cheaply for subsequent export to other developed country markets.

According to Capling (2011) the supposedly ‘non-discriminatory’ nature of the WTO is actually a barrier to investing in ‘protection.’ PTAs are discriminatory in nature as they raise barriers to outsiders while offering protection to insiders. This happens due to the Rules of Origin (ROOs), an essential feature of PTAs that determine which goods are eligible for preferential access. This protective nature of PTAs is attractive to MNCs because ROOs can be structured in quite restrictive ways so as to increase the costs of production by penalizing late entrants or firms from countries that are not party to a PTA. This means that there are considerable “first mover” advantages created by PTAs. PTAs then proliferate as a result of the domino effect. Excluded outsiders pressure their governments to pursue PTAs in markets where they have been disadvantaged by these deals.

In my viewpoint, having secured TRIPS - a critical first-mover advantage – through the multilateral arena of the WTO, MNCs are now more bent on extracting the advantage of such an agreement through the PTAs. Hence, one can see the rise of the TRIPS-plus thrusts in the PTAs.

In light of the above-outlined changing background of International Political Economy, Shaffer's (2008) critique of the WTO is critical. One should seriously consider the allegations that the WTO is simply interested in economic efficacy issues of enhancing poor countries' access to markets to compensate for forcing them to sign on to all aspects of WTO rules irrespective of whether they would ever be capable of enforcing them, even with the rudimentary and ineffective 'exceptions' given to them (Moon 2008). The WTO's attempt to harmonize one-size-fits all treatment, prevents poor countries from experimenting with institutional arrangements as solutions to the divergent bottlenecks, such as, discriminatory practices and unjust power relations that they face in their efforts towards achieving equity. This barrier to trade-relations has contributed to the stalling Doha Round Negotiations according to Indian Trade Secretary Rahul Kulkar, which may be interpreted as a good measure (Ghosh 2011; www.hindustantimes.com). For example, recently, the Indian Supreme Court kept alive the hope for access to medicines by rejecting Bayer Corps' appeal that would have allowed the introduction of the restrictive concept of patent-linkage (Tsui 2011).

How to Proceed in Executing the Study

I will seek to explore the above outlined complex interrelationships through exploration of the 'constitutive' process of the norm of TRIPS and CSR in two issue

areas – pharmaceuticals (product patents of medicines) and agriculture (biotechnology patents).¹¹ In pharmaceuticals, I will be looking at the issue of right to health and access to medicine (synthetic). My thrust will be that women as consumers primarily (producers marginally) are being victims of communicable diseases such as AIDS and non-communicable diseases such as cancer due to lack of socio-economic and political human rights. I will tie in this process with growing decimation of right to food security and health hazards due to contest over property rights and environmental degradation in the agricultural sector of food production and herbal medicines. Women as producers and consumers are increasingly suffering from insecurity of livelihood in a growing scenario of feminization of agriculture and its huge fallout of migration to urban areas and generation of prostitution and AIDS.

In methodology, I will be following the constructivist position that ‘constitutive is also causal’ (Wight 2006, Wendt 1999) and the feminist position that ‘epistemology is a methodological issue,’ (Zalewski 2006). The attempt will be at both critical reflexivity and policy solutions. Overall, I will be looking at the entire gamut of interplay in both the economic and the political arena to construct a coherent narrative of unbalanced growth and the need for development of human rights and sustainability. The narrative will seek to demonstrate how the disjuncture of social and natural capital due to structural mismatches in neo-medieval governance leads to undermining of women’s progress or

¹¹ A key banner of my study is of course knowledge economy and IPR. Within IPR, I will look at bio-patents only. I will not look at software patents needed to model genome sequences. I will also not look at copyrights and trademarks (Helfer and Austin, 2011). The rationale behind this is that I am interested in two intricately intertwined basic rights of survival for women – health and food. Copyrights and trademarks are not directly relevant for this purpose. Software patents are indirectly related, but exploring them is not an absolute necessity for my project.

capabilities, their inability to generate the innovation that historically have been their preserve, and silencing of their voices.

I select India as my case study since it is an emerging economy whose dynamics of growth and equity has significant bearing in understanding the impact of development on human rights of women and vice versa. India has the dubious distinction of being the paradox that has phenomenal growth rate and at the same time has a status of being second lowest in the spectrum of women's status in the world (World Bank Report 2011; World Bank Genderstats on India). More critically, India has jumped into the knowledge revolution by bypassing the industrial revolution and not taking significant measures to improve agriculture (Dahlman and Utz 2005).¹² Despite leapfrogging to knowledge revolution and being the leading producer of cheap generic drugs in the world, due to IPR restrictions and lack of political will, India fails to provide women with access to necessary medicine, particularly those related to communicable and non-communicable diseases.

At the domestic level, I will be specifically comparing two Northern Indian states West Bengal (left-center, middle-income, more agricultural) and Maharashtra (right-center, high income, more industrial and service-oriented) [see map of India]. In this way, I will seek to blend International Politics issues of security and justice with specific issue-areas in International Political Economy and how this can be highlighted further through a Comparative Politics component. To look at the mezzo and micro dynamics, one need

¹² This is evident in that, despite efforts to create a Biodiversity Register, India still fails to take stock of the existing genetic potentials in the country and nurture them through holistic measures that enhance food production, availability and nutritional quality (Paul and Mukhopadhyay 2010).

to understand that India is a good example of a ‘composite polity’ as seen in medieval times (Nexon 2009). This is due to the fact that despite having the hard-shell of sovereign, territorial, nation-state and an overall structure of democratic governance and market-economy it is defined by enormous diversity in ethnicity, economic, and political forms. There are multiple layers of authority in India with multiple patron-client relations and intermediaries of political elites and ruled that varies not only by federal-state relations but also within state relations and regional affiliations. It is a classic case to study the impact of neo-medieval governance.

Given India’s interesting case of multi-layered domestic governance structure, at the micro level, I will limit my investigation to understanding how different unaffiliated networks of firms, gender and community networks (such as the self-help groups) and civil society actor networks bridge the structural holes between themselves (Nexon 2009). The purpose is to analyze how these constituent actors resolve collective action problem of ensuring material resources for sustainable development, knowledge, and benefit-sharing – both monetary and non-monetary - in order to generate innovation, the critical driver of growth in knowledge economy. Such an undertaking is critical particularly after the incorporation of the Nagoya Protocol as part of the Convention on Biological Diversity (Buck and Hamilton 2011) and the kind of patents that are being permitted in the post-TRIPS scenario in agriculture in India (Kapur 2011) and its impact on the sovereign retention of biological diversity for India (Srivastava 2012; Prathapan and Rajan 2011). I will also analyze the kind of formal institutions the networks access to facilitate the effective use of extant informal social ties that embody tacit knowledge that

requires to be codified in order to be commoditized for ‘fair trade.’ This will also demonstrate the kind of pressures that market and local networks brings upon state and the kind of responses generated by such pressures.

I hope that the above-outlined mode of analysis will be the kind of ‘holistic’ analysis prescribed by Chung and Lee (2009). For these authors, sustainable development has a goal to integrate economic, ecological, social and institutional subsystem into a whole, taking care of their mutual influence. Golusin and Ivanovic (2009) divide these sub-systems and their indicators into the schema of a conceptual framework of ‘pressure–state–response.’¹³ This type of analysis will situate my study in the tradition of sociological, relational and historical institutionalism (Nexon 2009) and also the governance approach to institutionalism (Jackson and Deeg 2008). The governance approach seeks to

map institutional diversity in terms of generic coordination mechanisms used in the governance of economic activity. Beyond the traditional distinction between markets and hierarchies, the framework includes communities, the state, networks, and associations (Jackson and Deeg 2008: 688).

This approach will enable me to see path-dependencies, network externalities, lock-ins (Vanloqueren and Baret 2009), as well as institutional choices and actor behavior in terms of self-interest and social obligations that lead to variation in vertical and horizontal distribution of power.

¹³ Pressure = burden of activities on the environment; State = conditions of the environment and development; Response = success of ecological politics and economic development.

In the process of such an analysis what will hopefully be revealed is the macro-political system's dynamics within which such multi-networks are embedded. This will enable me to see how central actors like federal and state government of India, other nation-states, international institutions and national and transnational civil society movements relate to each other to bring about growth and human rights. Hence, my analysis will be situated not in the tradition of seeing politics as markets but rather of 'markets as politics' (Schlumberger 2008). This will hopefully reveal the prevalence of multiple hybrid forms of governance that combines both market and hierarchy and goes beyond it. Within such hybrid forms, ownership of key assets in terms of IPR is highly contested (Makadok and Coff 2009). Mapping this conflict would help to engender pragmatic development of policy solutions.

My issue-specific areas are pharmaceuticals and agriculture. I am interested in seeing the impact of standardized, universal IPR on women's rights to access of medicine and food. In the case of synthetic medicine, women are mostly consumers with lack of access. However, in the case of herbal medicine they are both producers and consumers. Similarly, as sources of traditional knowledge of seed preservation, women are also both producers and consumers of food. In the last two cases they are particularly vulnerable due to issues of biopiracy. Overall, they are vulnerable due to lack of support systems, both cultural and institutional (Ackerly 2008) that would enable them to become stronger participants in creation of value and receiving a 'fair' share of it in an exchange-process.

My goal is also to gather qualitative and quantitative data that reveals how patents are impacting women's welfare in India. This includes looking at quantitative and

qualitative aspects of development in the two sectors of pharmaceuticals and agriculture in terms of growth. It also includes delving into international institutional data on India, such as that provided by the World Bank (HDI and Genderstats being examples),¹⁴ CGIAR, IFPRI, as well as looking at empirical research done on India on the relevant topics; for example studies on gender malnutrition that analyzes Indian National Family Health Survey data (Navaneetham and Dharmalingam 2011; Balgir 2011) to see the impact on equity.

I will also look at multidisciplinary academic outputs, newspaper archives, and online postings, to see the impact of the implementation of TRIPS in India in the realm of patents relating to biotechnology in pharmaceutical and agriculture. This will reveal the interactive dimensions of relations between civil society movements, gender networks, indigenous communities and business.

These methods, I hope will help me to bring about a synthesis of data on the population of women affected by HIV/AIDS and malnutrition due to various factors. Overall, then I should be able to paint a picture of how patents have generated severe gendered inequity in the area of health and food security and how multiple interest groups need to work together to more effectively harness institutional resources to bring about development through appropriate public policies and civil sector projects.

To reiterate, I will be looking at relevant economic indicators from the World Bank and government statistics. I will be looking at the HDI indicators and the GDI

¹⁴ Kuiper and Barker (2006) provides a feminist critic of the WB.

indicators of WB, IFPRI, and National Family Health survey. Beyond this, my study will be primarily archival.

FIGURE 4 – MAP OF INDIA



Structures of Following Chapters

In the second chapter, I look at non-codified knowledge that resides in the networks of tribal population (including women). I look at the repository of knowledge that is available among the tribal population of West Bengal and Maharashtra. I look at the mixed motives that the government has developed under the influence of knowledge economy. On the one hand there is significant biopiracy and patenting of such traditional knowledge is going on. This shows that CSR is not working. The government is fighting legal battles on the international front to protect traditional knowledge. On the other hand under the dictates of privatization and commercialization, as prescribed by the knowledge economy, the government is grabbing tribal forest land for commercial purposes and depriving the tribals of the resources needed to maintain their knowledge preserve. Given this decline in access to knowledge resources, I look at the countermovements generated by the civil society and at the health consequences of the tribal people.

In the third chapter I look at codified traditional knowledge of Ayurveda and modern allopathic knowledge. There has been significant growth in these sectors and patenting of such knowledge. However, access to medicines still remains a problem. Under neo-medieval governance, there has been some attempts to tackle market failures such as, lack of research for poor people's communicable diseases but on the whole corporations continue to display bad CSR. Access to medicines and good healthcare continue to be problems despite measures taken to privatize the healthcare sector. Health standards of the population, particularly of women, continue to be dire.

In the fourth chapter I point out that patented seeds continue to pose a threat to female farmers. On top of that female farmers' productivity suffer from lack of access to land, seeds and seed-technology. Given state retrenchment, agricultural growth has been falling. This lack of investment in agriculture along with patriarchal and caste discrimination make women's life difficult and cause them to face poverty and lack of food security. Knowledge-economy's promise of growth leading to equity does not pan out. Maharashtra is a classic case of an economically fast growing sub-state whose rural population is suffering severely from lack of health and food security.

The fifth chapter provides for conclusion of the overall thesis findings. The main thrust of this chapter is that growth has failed to bear fruits and poverty is on the rise. I point out how assumptions of knowledge-economy have failed to bear fruits. Instead of welfare, social dislocation has increased.

CHAPTER TWO: FOLK VERSION OF TRADITIONAL KNOWLEDGE

Introduction

The paradigm of knowledge economy embodies the idea that knowledge is the key to attaining sustainable growth and equity, specifically health equity, since knowledge is non-diminishing and renewable. Based on such an understanding, neoliberals or the proponents of knowledge economy have made IPRs the flagship of such an economy. The government of India (GOI) has embraced the paradigm of knowledge-economy as a modality of growth and welfare and has unleashed a free-market economy. The GOI embraced the paradigm of knowledge economy in exchange for international help from the World Bank and the IMF after the 90s external balance of payments debacle.

Neoliberals prefer economics to be separate from politics and the social sphere. Neoliberals view the state as a coercive entity prone to corruption, susceptible to manipulation of special interests and ultimately an inefficient institution (Boetsch 2005). In contrast market is considered an efficient institution where voluntary and decentralized transactions of atomized actors leads to democracy. An auto regulated market is

considered to have perfect competition, perfect information, perfect allocation of resources, and perfect mobility of factors of production all of which enables perfect rational cost- benefit calculus and choice of individuals and hence, democracy. On this basis neoliberals recommend state retrenchment from the public sphere. While neoliberals' allegations are partially true, in reality the state is much more than an inefficient institution. It is an organization that ensures that social compact derived from collective will is maintained; that there is protection offered to vulnerable sections of society; all types of people's civil liberties are maintained; and people's will is embodied in democratic decision-making. State retrenchment thus represents a democratic deficit. With retrenchment, the state is dis-incentivized to protect the welfare of the poor.

Neoliberals assumptions of welfare derived from a free market economy has major flaws. Neoliberals fail to see a significant point. They fail to see the tension that politics inevitably has with economics in trying to define growth and justice. It is true that in unleashing knowledge economy states have become complicit with markets in handing over the role of growth and justice to markets. However, the hierarchy of authority that lies within state sovereignty has an intractable power that inevitably clash with the horizontal logic of free market situation of anarchy. Thus, mixed motives emerge. The state is often the protector of its populace and simultaneously the entity that is responsible for anarchic exploitation of its populace through unleashing of free-market economy.

Between the opposite trends of state protection and exploitation, the greater trend these days has been the retrenchment of states from developmental welfare. This creates for a democratic deficit in terms of unravelling of the social compact that exists between

the state and its citizens. This state retrenchment affects the assumptions and predictions made by knowledge economy in terms of growth and equity. In this chapter we seek to demonstrate that growth in traditional knowledge is dwindling along with equity of health. This is because without the state working to ensure the preconditions of free-market assumptions such as, initial distribution of developmental equity, equity in empirical reality cannot be achieved through free-market conditions. If democracy depends on the purchasing power of money, then initial inequity prevents people from achieving not just economic democracy but also political democracy.

Neoliberals point to voluntary best practices, such as, CSR by powerful market actors like corporations as a market solution to inequity in power distribution. But, such CSR has not been successful in ensuring the triumph of human rights and pure justice over and above profit-motivated greed that fuels free-market economy. Without market regulation, unethical practices tend to decimate equity.

Based on the above outlined understanding, in this chapter, several things are explored. First, some examples of the store of knowledge regarding health remedies that is present among tribal population, including women, in Maharashtra and West Bengal is elucidated. This is critical to understand for despite this store of knowledge the health condition of the tribal people of India is dire.

The health situation of the tribals is dire because this knowledge is not cultivated in a manner that is beneficial for the communities of scheduled tribes (STs). Knowledge economy tends not to see knowledge as being embedded in relational networks. Nor is knowledge seen as functional for maintenance of a community in itself. Instead

knowledge is seen as individualistic, commodified and utilitarian only in a market-exchange situation. Hence, free-market has been unleashed for development of patent-based knowledge. However, STs, the most oppressed and poor people in India are not developed enough and dis-embedded from their communities enough to have individual patent based knowledge. STs are not atomized actors of an auto-regulated free-market asocial economy. The inability to understand this basic difference between community-based knowledge and individual knowledge has meant that the government of India (GOI) tends to simply document their knowledge and commercially exploit forest resources, the basis of such knowledge, for state interests. The GOI is less vested in development of ST communities and their knowledge for the development and conservation of the communities.

Unleashing of the free market without corresponding development of the masses to prepare them for transacting in and surviving within a free market arena has meant that knowledge cannot be protected via patents. The overall lack of development has brought about distressed responses among the STs expressed in the rise of extremism in India. In the presence of extremism and lack of resources to develop knowledge bases, knowledge dwindles.

Second, in this chapter, the issue of biopiracy is explored. In neo-medieval governance of 'biology' (including plant medicine and land on which it is cultivated) there has been a constant struggle between the Indian state and market forces over control of traditional knowledge. The Indian government has been undertaking extensive documentation of traditional knowledge in the Traditional Knowledge Digital Library

(TDKL). However, mere documentation does not guarantee that IPR issues will be protected from theft.

Biopiracy occurs because there is a lack of protection of IPR of traditional knowledge. This lack of protection arises from two things. First, tribal people do not know about the necessity of IPR to protect knowledge and often give it away for free to private entities. According to knowledge economy and its flagship international law TRIPS, patents acts as incentives for growth of efficient human capital. But, not everyone has that knowledge about patents or views the world through the lens of individual patents as property rights. Communities of tribal people see knowledge as embedded within communities (an intellectual commons) rather than knowledge as a source of individual property right. This attitude contributes to knowledge being given away freely. Second, biotechnological inventions being made, using traditional knowledge through identification of bioactive compounds, are often not protected as prior art in other countries, such as, the USA. The fact that traditional knowledge present in the public domain of other countries is not pre-art but a novel act of invention for USA has allowed for patentability of traditional knowledge. This has led to deprivation of all original holders of such folk knowledge from modern, market and efficiency-based benefits of their knowledge (Bala ssrn.com).

Given the lack of protection of traditional knowledge, it is critical to look at some examples of biopiracy in India. Contra TRIPS prediction, knowledge of the poor people has not translated into patents for the poor people, rather such knowledge has been stolen by powerful entities, such as, the company Monsanto. Knowledge has not translated into

benefits for the poor. However, the Indian state is increasingly asserting its sovereignty over market forces such as Monsanto to prevent biopiracy. In neo-medieval governance of biology, in so far as plant medicine is concerned, sovereignty seems to be making headway against transnational market forces.

Third, in this chapter, the issue of traditional knowledge of plant medicine in terms of such knowledge being accessible as resource is explored. Knowledge as resource is a source of choice and decision-making or agency of women and the networks of women in which such knowledge resides. Hence, the outcomes of such choices or lack of choices on the life chances of tribal women is explored. In short, beyond knowledge it is necessary to look at issues of access to forest land or natural capital as the source of sustainability of such knowledge-base. Such knowledge-base helps to build human capital and innovations and sustain social capital. But, knowledge economy fails to take into account the initial inequity that arises due to lack of access to knowledge-bases and how that denudes social capital and constrains innovation. Moreover, land grabs for commercial purposes are on the rise in India. Under such situation, contra knowledge economy prediction, instead of individual property rights being on the rise there is increasing loss of property right due to loss of ancestral lands by tribals.

When non-timber forest produce (NTFP), the source of plant medicine, is not easily available to tribal women and they do not possess forest land on which to cultivate medicinal crops and plants, knowledge-base dwindles and so does innovation. Also, under such circumstances, especially when there is lack of widespread alternative income opportunities, severe malnutrition makes survival difficult. Non-surviving and sick

populace can hardly care for forests. Also, lack of alternative income sources causes distress migration to take place. When women migrate, forests do not get conserved by women who have the best knowledge for it. Knowledge under such circumstances is lost rather than renewed. Under the situation where forests do not get conserved despite the existence of knowledge regarding conservation, what happens is a unique Tragedy of the Commons. In tragedy of the commons knowledge available is not efficiently used to preserve forests. Forests, as resource-base of knowledge do not get renewed.

To understand how contra knowledge economy prediction, knowledge is dwindling, it is critical to have some understanding of the repressive history of forest laws in India. Such history also helps to bring out the fact that the GOI asserts its sovereignty over land and tries to use the land for commercial purposes or for growth. But, the GOI faces strong push-back from the civil society against land grabs. The push-back is both peaceful and violent. The tribals are the poorest of the poor and the most marginalized section of the society. Their protest has often taken violent form as can be seen in the Maoist movements. Peaceful protests under the aegis of grassroots organization such as the National Alliance of People's Movements have failed to stop state violence and yield results in the form of overall development of the tribals (Walker 2009).

The Indian state faced with the internal crisis of extremism has not withered away. Rather it has been undertaking repressive steps to assert its sovereignty. However, distributional equity rather than repression is the way to justice. Distributional equity in the form of land redistribution is critical for preservation of knowledge and for providing

justice. Instead of distributional equity trickling down as a result of free-market private forces, as visualized by knowledge economy, equity and growth in knowledge is likely to occur when the government takes active steps to ensure them by redistributing land. The GOI has taken some pro-poor steps to help in development of tribes, but such steps have failed to provide for peace. Knowledge economy has failed to anticipate such developmental failure and civil society backlash.

Fourth, in this chapter, the health situation of tribals as a negative welfare outcome of government policies is documented. Contra knowledge-economy prediction of welfare, there is unsustainable health outcomes despite the presence of traditional knowledge regarding health. It is not surprising that within an atmosphere of declining abundance of knowledge, due to lack of access to knowledge resources, tribal people suffer from various health problems. This is contra predictions of knowledge economy that knowledge base will provide for better equity.

Knowledge economy does not recognize that people need to have constant resource base to sustain knowledge-base. It claims that knowledge is non-diminishing, as if knowledge is self-sustaining. However, this chapter points out that without resource-base such as land and access to forest products, knowledge of plant medicine is non-sustainable. According to Khosla and Hunt (2012), 'in international human rights law, the right to health is subject to resource availability,' (36). This chapter points out that without resources sustainability health equity becomes difficult to achieve and the tribal people are deprived of their right to life. When tribal people are deprived of their right to

life, efficient human capital, as predicted by knowledge economy, cannot be formed. Similarly, under health crisis innovation in knowledge cannot occur.

Fifth, it is critical to note that beyond government entities, NGOs are another critical actor in neo-medieval governance. Hence, the facilitating work of NGOs in ameliorating tribal health is also highlighted in this chapter. Throughout the chapter the focus is on the two sub-states of Maharashtra and West Bengal, with a focus on the national level where necessary.

Store of Health Knowledge in Maharashtra

Maharashtra is the third largest state in India and has the second largest tribal population of 10.2% (Ganiger et al. 2011). For tribal women, forests are critical sources for fodder, fuelwood and medicine. Herbal ethno-medicine tend to be a mixture of plants, animal products and minerals, along with various rituals and practices that are used in the process of administering them (Kulkarni and Deshpande 2011). For illiterate and socio-economically backward, poorest of the poor population in India, such medicines are absolute lifeline for survival. Such knowledge is uncodified unlike that of the Ayurveda medicines, have a base in the community, is oral and passed down from generation to generation. Hence, saving the utilization potential of such knowledge is very important. Hence, it is critical to note some examples of the kind of knowledge that is available among the tribal people. The studies cited here as examples of tribal knowledge are mostly field-studies.

Patil and Patil (2005) record the etnomedicinal practices of the tribes of Mahadeo Koli, Katkari, Bhils, Kunabi-kokona, Thakurs and Warlis in the Nasik district of Western

Ghats of Maharashtra. Antidotes in their various decoctions to counter snake-bites, scorpion-stings, gastro-intestinal disorders, diabetes, leucorrhea, cough-cold headache, kidney stone, pediatric vermifuge, etc., are recorded as diseases treated by the tribals.

Kosalge and Fursule (2009), found that the Pawara tribals living in Satpuda hills of Nandurbar district of Maharashtra regularly use 52 species of plants belonging to 36 families to cure diseases like skin disorders, menstrual problems, burn, diarrhea, mouth ulcer, fever, joint pain, abdominal pain, piles, jaundice, migraine, wounds, dog bite, urinary problems, intestinal worms, and as anthelmintic and abortifacient.

Bhardwaj et al. (2011) document 47 plants in Amravati and Yavatmal district in Maharashtra. The plants are used to treat conditions like inflammation, fever, hepatic disorder, hypertension, wounds, leprosy, TB, etc.

Kamble et al. (2010) document the practices of the Bhilla tribe of Jalgaon, and Nandurbar districts of Maharashtra. They identify 127 plants belonging to 116 genera and 59 families of flowering plants and ferns used to treat diseases such as cholera, malaria in humans and curing cattle's stomach inflation.

Katkari tribes live in the Thane and Raigad districts of Western Maharashtra. They lead a pre-agricultural life and live in extreme poverty and in non-hygienic situations. They use plants to cure both human and livestock diseases. Kulkarni and Deshpande (2011) outline cure for 35 diseases, including the cure for cobra snake bite. The medicinal decoctions are made from plant parts such as bark leaves, seeds, flowers, latex, etc., of 33 plants; body products such as stomach, scales, adipose tissue etc., from 7 animals; and minerals such as sulfur, camphor, calcium carbonate, nickel, etc.

Nimbekar et al. (2011) found that the Gond tribe of the Gondia district uses 95 plant species belonging to 48 families to treat a variety of ailments. Such ailments include sunstroke related vomiting and sunburns, epilepsy, cardiac diseases, toothaches, children's acute leukemia, chronic bronchitis, reduction of obesity, prevention of miscarriage, etc. Beyond diseases, plant medicine is also used for cosmetic purposes of promoting beauty. Hence, there is use of medicines such as astringent, greases and lotions as excipients, prevention of foul breath, increase of vigor and strength and aphrodisiac activity.

Jagtap et al. (2006) document the ethnomedicinal practices of the Korku tribe of Amravati district of Maharashtra. Korkus use 66 species of plants belonging to 40 families to reduce vaginal discharge, induce sterility, cure encephalitis, and stroke among humans; and fracture and prolapse in cattle. In the community, traditional healers or 'Bhumkas' transfer the knowledge of medicine to select teenagers who work as their assistants. Problem is that if the teenagers choose to leave their traditional way of life, not only is such knowledge lost, conservation of plants become problematic. Hence, it is critical to note that the authors document 9 plant species that are on the endangered red-listed species.

Ghotge et al. (2002) also note the attempts of Anthra -an organization of women veterinary scientists - to document ethnoveterinary and animal management practices of tribal groups such as Katkaris and Kunbis living in the Ratnagiri district. Anthra documented 161 treatments for 24 disease conditions such as Foot and Mouth disease, Fowl Pox, TB, Maggot wounds, snake bites, digestive disorders, dysentery, birthing

difficulties, etc. Such knowledge is crucial because hospitals are distant, veterinary scientists are few, treatment costs are prohibitively expensive and often not available when needed. When it comes to problems of knowledge access, the barriers are not just a lack of adequate modern infrastructure it is also cultural exclusion of women by men in the communities from such knowledge base. The authors document how women despite such exclusion have developed treatment expertise such as knowledge relating to pregnant and lactating mothers through their own initiatives. Given the increasing feminization of agriculture, such knowledge dissemination and preservation becomes critical for women.

In Maharashtra, the National Medicinal Plant Board, the all-India NGO Foundation for Revitalization of Local Health Tradition (FRLHT) and Pune district based NGO Rural Communes Medicinal Plant Conservation Centre (RCMPCC) have been involved in 13 projects working with tribal women and healers to conserve and document knowledge. The RCMPCC has created a systematic database on 326 medicinal plants, 465 herbal formulations, illness-specific database on 265 plants, a herbarium record of 804 species and initiated the People's Biodiversity Register to document women's and healers knowledge. As part of the resource institution of the State Medicinal Plant Board, it has conducted market study of 22 medicinal plants with the goal of providing benefit-sharing to the tribes (Shukla and Gardner, 2006). Such conservation and developmental efforts are direly needed to ensure continuity of knowledge.

Store of Health Knowledge in West Bengal

According to Das and Bose (2010) 5.5% of Bengals' population is Scheduled Tribes (ST). 80% of them follow Hinduism along with their traditional beliefs in spirits and nature. Several authors have documented the knowledge bases of tribes in Bengal.

Bantawa and Rai (2009) undertook a study of the knowledge repository of traditional practitioners and older folks of the Nepalese tribal communities of the Darjeeling district of the Eastern Himalayas. They found that 41 plant species belonging to 26 families and 41 genera are used for curative purposes such as food poisoning, fever, headache, body-ache, sinuses and tonsillitis, bone fracture and dislocation, mouth ulcer, external boils, diarrhea, liver cirrhosis, rabies, hysteria, wormifuge like tapeworm, abortion, blood dysentery, jaundice, regulation of menstrual cycle, pyorrhea and gingivitis, TB and diabetes.

The knowledge of cure of diabetes among the Nepalese tribe is a critical knowledge. The healers of the Nepalese tribe crush the root extract of *Asparagus racenosus* and administer it orally for curing diabetes. They use *Costus speciosus*' stem juice as an oral dose to cure juvenile diabetes. One should note that diabetes is a first world disease and a leading disease in India. Hence, this Nepalese tribal knowledge would be of great worth to foreign and local companies who could use such knowledge as part of a benefit-sharing scheme.

Bantawa and Rai (2009), also point out that species like *A. heterophyllum* used for food poisoning, *P. scrophulariaeflora* used against snake bites have great trade value in medicinal markets. However, due to the secretiveness of the healers who believe that

general knowledge diffusion among other people may reduce the efficacy and proper use of such knowledge, knowledge tends to die with the healers. Knowledge is lost especially when the young generation migrate and do not care to learn such knowledge.

Given the widespread prevalence of chronic disease diabetes in the West and in India, it is important to note that the Sikkim and Darjeeling Himalayan region tribal people use at least 37 plant species from 28 families as anti-diabetic agents (Chhetri et al. 2005).¹⁵ The authors point out that 30 species that they found had not been reported as hypoglycemic agents in the Dictionary of Indian Folk Medicine and Ethnobotany. If the pharmacological community of India, studied the mechanisms of such medicines, such as whether they act by stimulating the function or number of beta cells and thus increase insulin release or whether they help decrease blood glucose synthesis due to decrease of activity of enzymes like glucose-6-phosphate, they could propagate the use of such drugs and enable the benefit-sharing of such knowledge use for the tribes.

Hussain and Hore (2007) found 28 medicinal plants belonging to 26 genera and 19 families in the state of Sikkim and the adjoining Darjeeling district of West Bengal. The Nepalese tribe of Darjeeling is a conglomerate of Mongoloid tribes like Sherpa, Limbu, Tamang, Yolmo, Kogatay, etc. The tribes use medicinal plants for treating early stages of cervix cancer, liver disorders, malaria, diabetes, diarrhea, snakebites, epilepsy, mental ailments, asthma and bronchial congestion, childbirth, purgative purposes, excessive menstrual bleeding, ulcers, TB, jaundice, anemia, rheum and gout, fracture,

¹⁵ For example, a root decoction of 10-15 ml. of the herb *Aconitum plamatum* is taken with a cup of milk one time daily after lunch for 7-10 days to reduce glucose levels.

mumps, wounds, and gonorrhoea.¹⁶ The authors note that the growing demand of raw materials by pharmaceutical companies has led to ‘unscientific’ gathering of plants from the wild. Poor marketing and middlemen exploitation has prevented the tribes from taking up ex situ cultivation and conservation of these plants.

Mandal and Mondal (2011) collected 5 plant species of ferns used by tribes from West Midnapore district of Bengal and conducted experiments on the plant extracts on four different bacteria. The results demonstrated that all the plant extracts and their solvents gave better inhibition at high concentration of the extract. This finding overlapped with the folk medicinal knowledge they had documented. Overall, the ferns were used by the tribes to cure rheumatism, scabies, eczema, carbuncle and wounds, sciatica pain, whooping cough, dysentery, cataract, early stages of phthisis and wormifuge. The ferns were also used as biofertilizers.¹⁷

According to Pandit (2010) tribal communities of Jhargram division of West Midnapore district have a significant repertoire of ethno-veterinary medicinal knowledge. The authors gathered animal care knowledge from women folk, Joint Forest Management Committee (JFMC) members, local experienced people, user group and local healers called Vaidyas and Ojhas. Among the 288 plant species found in the area, the tribal people used 96 plant species to cure 37 types of diseases. Of these, 33 plants were used to cure single diseases and 33 were used to cure multiple diseases. Diseases treated included

¹⁶ The authors point out that the bark of plant *Taxus baccata* used for epilepsy by the tribes is the source of anti-cancer drug Taxol.

¹⁷ Currently, the authors note, *Dryopteris filix-mas* species of fern is one of the best taeniocidal drugs available.

diarrhea, dysentery, arthritis, constipation, maggot wound, ticks and lice parasites, snake bite, black quarter disease, sore throat, rinder pest, worm infection, bone fracture and broken horn, dyspepsia, foot and mouth disease, asthma, dog bite, anti-helminthes, tumor, blood in urine, skin disease, jaundice, quick expulsion of placenta after delivery, and retention of milk. The tribal people cultivated on their land 43 plant species used for medicinal purposes. They also cultivated the plants for agricultural, food and fodder purposes. They avoided modern veterinary medicines since such medicines were costly, not readily available in remote pockets and have side effects.

Bhakat et al. (2007) point out that the advent of 'scientific forestry' has shifted the emphasis of conservation on a few commercially prized species in West Midnapore district. A host of traditionally important plants having good potential for commercial exploitation have failed to attract government management plans. Hence, sacred or religious groves of the Bhumij, Kora, Lodha, Munda and Santhal tribes become important sources of conservation of medicinal plants. Such groves are part-marshy and part terrestrial and stand as island of evergreen and deciduous forest amidst the crop fields in the area. Such groves provide at least 19 medicinal plants for cure of various ailments.

Basu (2009) points out that sacred groves are natural treasure houses of medicinal plants and are traditionally conserved by the tribes because of their function as religious and medicinal source. However, given the history of exclusion of tribes from access to forests, currently, sacred groves in the Bankura district are threatened by genetic erosion of indigenous species. Such erosion happens because of invasion of exotic weeds, pest-

infestation such as termites, white ants and fungi, and natural disasters leading to soil erosion. The groves are also threatened by population pressure, encroachments, poaching, commercial exploitation, etc. Yet, the 10.36% of Santhal and Koramundi tribes living in this area have knowledge of 28 medicinal plants that are available in these groves. The tribes use the plants for curing various diseases such as cough, fever, venereal diseases, sole cracks and skin diseases, eczema, pneumonic chest pain, blood dysentery, gonorrhoea, dyspepsia, jaundice, toothache, typhoid, rheum and gout, earache and pus, eye diseases, and malarial fever. But, non-access and degradation has increasingly meant loss of welfare for the tribes.

Konar (2010) points out similar problems with sacred groves for the 18.27% of Scheduled Tribes (STs) who live in the extremely backward part of western Purulia district. As tourism and development takes place in this area and tribal land is encroached upon, and sacred groves are decimated. The tribes are also subjected to atrocities such as murder, rape, arson, etc., and exploited by landlords, moneylenders, contractors and government officials. Dispossession, displacement, disempowerment and disenfranchisement have become the order of the day. It is then not surprising that the tribes here suffer from unprecedented levels of poverty, hunger, malnutrition and starvation.

Overall, the tribal women's situation, according to Konar (2010), is worsened by the fact that communities are caught between extremes of corrupt government officials and extremist Maoist organizations who claim to fight for rights on behalf of the tribals. Under circumstances of violence, women can no longer conserve the sacred groves or common property resources (CPR). This has brought out the 'unique' Tragedy of the

Commons. Moreover, since women are often landless, they rely heavily on CPR for household purposes. Loss of customary access to CPRs has meant increasing poverty (Beck and Ghosh, 2000). There is also health degradation due to pollution of water bases of CPRs. Since women come into contact with water the most they are exposed to water-borne diseases such as diarrhea, hook worm, cholera, typhoid, paratyphoid, and so on.

According to Konar (2010), a small section of the tribal people has managed to utilize their voice to capture the benefits granted by the GOI in the form of Tribal Development Projects, Special Concessions, Reservations, etc. The tribal people have also benefitted to some extent due to the work of NGOs. For example, NGO PRADAN is working with 8,000 families on a Watershed Development Program. Also predominant in the area is the NGO Kheriya-Shabar Kalyan Samiti, set up by the famous Bengali woman writer Mahasweta Devi.¹⁸

According to Beck and Ghosh (2000) during the period 1993-96 CPRs added US\$5 billion annually to the income of poor rural households in the districts of Bardhaman, Purulia, Birbhum, Jalpaiguri, North 24 Parganas, and South 24 Parganas. This was about two and a half times the total of World Bank lending to India in 1996, about twice the foreign direct investment (FDI) in 1996, and more than twice the amount of official development assistance for the same year. Despite such proven livelihood potentials of CPRs, women have been systematically excluded from customary access to CPRs by the local government at an alarming rate. As a result, for example, dense forest

¹⁸ Overall lack of integration of the tribes into the modern civilized world has meant growing influence of fundamentalist practices such as oppression of women by labeling them as witches, increasing practice of polygamy, and violence against women.

covers of Purulia reported 50 years ago has degenerated. Due to lack of maintenance and proper care, the number of species and products as well as the output of existing resources is declining. As biodiversity conservation declines, knowledge associated with that diversity declines. Thus, growth promised by knowledge economy remains unfulfilled.

Neo-medieval Governance of Biology and Biopiracy in India

Neo-medieval governance represents a tussle for supremacy between sovereign forces of the state and the market forces. Under the dictates of knowledge economy, the state has been steadily withdrawing from the public sector. However, when it comes to prevention of theft of traditional knowledge by market entities such as large corporations, the GOI has been strongly active in ensuring that justice is rendered in cases where there is clear-cut evidence of knowledge theft or biopiracy. However, such actions had not necessarily translated into holistic development of communities of STs. The state seems driven more by utilitarian interests of the ability for exploitation of such knowledge rather than developing products and ensuring benefit-sharing for communities. NGOs on the other hand are more interested in protecting such knowledge for the benefit of the community.

Knowledge economy visualizes a market where voluntary, power-free transactions take place. However, such a vision cannot account for biopiracy where powerful corporations steal the knowledge of poor powerless tribal people.

Biopiracy at the national level is critical to note because it deprives indigenous people of their knowledge and does not compensate them for their knowledge. Biopiracy

heightens the sense of importance of preserving the traditional knowledge base and promoting them indigenously to help benefit the communities. One of the first steps that the Indian government took to counter biopiracy was to create the TDKL to document the knowledge of plants and traditional remedies. The Indian government then licensed 200,000 local treatments as ‘public property.’ Such knowledge was free for use but no one could sell such knowledge as a ‘brand.’ This did not help in bringing specific benefits to specific communities who developed the knowledge over generations.

The documentation through TDKL happened as Indian scientists noted an alarming trend of bio-prospecting of natural remedies by foreign companies. After going through the records of global trademark offices, Indian officials found 5,000 patents had been granted for traditional medicinal plants, more than 2000 of which belonged to the Indian system of medicine. The companies involved had spent about \$150 million to get such patents, without providing any compensatory benefits to the original holders of such knowledge. This caused concern among the scientists. Beyond concern, to see such extensive patenting of traditional knowledge raised eyebrows of the scientists, especially Dr. Vinod Kumar Gupta, the head of the TDKL. The cause for such surprise was that multinationals (MNCs) were spending millions on traditional remedies when many lobbies in the Western world denied the validity of such traditional forms of treatments (prorev.com). The extensive patenting proved that traditional knowledge has huge commercial potential. Hence, biopiracy is a significant concern for the developing world even as it is ignored by the developed world.

Given the vast store of traditional knowledge base in India, it is critical to note the history of biopiracy in India. India's fight against biopiracy began in the mid-90s, ironically, at the time that the country signed onto product patent of TRIPS.

The first case of biopiracy was that of turmeric. Turmeric (*Curcuma longa*) has antibiotic, antioxidant, anti-inflammatory and coagulant properties. In 1995, two patents were filed by University of Mississippi Medical Center and one by Northwestern Flavors Inc. and Northwestern Chemical Company. The Indian body Council of Scientific and Industrial Research (CSIR) successfully appealed the decision to the US Patent and Trademark Office (USPTO) and got the patents revoked.

India's next fight was against W.R. Grace Company and the US Department of Agriculture for their filed patents for a fungicide derived from the Neem (*Azadirachta indica*) tree (Bala ssrn.com). The lawsuits against patents on Neem and Turmeric required an expenditure of \$5 million, something India could ill afford, but, most importantly, the case of Neem took 10 years to settle (prorev.com) in the European Patent Office (EPO). In this fight a host of international NGOs and Indian NGOs including Vandana Shiva's Navdanya was actively involved.

Beyond turmeric and neem, there were several prominent biopiracy cases, all of which did not get complete resolution. First in 1997, US company Rice Tec Inc. cross-bred 22 traditional varieties of rice from India and Pakistan. The company had 20 claims in its patent based on its novel rice lines developed from rice germplasm as well as those based on traditional farmer bred varieties. Most importantly, the company hijacked the traditional name of 'Basmati' for its new rice germplasm. After complaint from the

Indian government, in 2001 the USPTO only allowed 5 claims and denied the usage of the term Basmati.

In 2006, the American MNC Natreon Inc. claimed the use of Aswagandha (*Withania somnifera*) as stress reducing agent as novel application of the medicinal plant. After Dr. Gupta, TDKL head filed a complaint to EPO that this drug had been used to treat depression, insomnia, gastritis, gastric ulcer and convulsion since ages, the EPO rejected the patent application in 2010.

More recent fights of the Indian government includes a 2009-2010 fight that foiled claims by a Danish company Claras ApS over a herbal combination of ginger (*Zingiber officinale*), onion (*Allum cepa*), cumin seed (*Cumminum cyminum*) and turmeric as a slimming agent. The EPO agreed that there was no novelty in the patent since this knowledge was prior art, that is, it existed in the public domain long before its patent filing, as proven by documentation in the TDKL.

India has also foiled attempt by a Chinese pharmaceutical company Livzon to patent pudina/mint and kalamegha (*Andrographis* from family *Acanthaceae*) to treat H5N1 avian influenza. EPO after scrutinizing the evidence provided by CSIR from various ancient Indian texts rejected the patent application in 2010.

Three fights on biopiracy are still ongoing. First, is the claims made by Pioneer Hi-bred/Dupont International Inc. over mustard and 'NapHal' wheat variety by the Monsanto Seed Company. Second, in February 2011, the renowned Indian activist Vandana Shiva, her NGO Navadanya and the European NGO-platform No Patent on Seeds joined forces to file an opposition against European patent granted to Monsanto on

melon originating in India and already registered in international seed banks. The melon had natural resistance to certain plant viruses, such as the Cucurbit yellow stunting disorder virus that has been spreading through North America, North Africa and Europe. The melon was claimed to be an invention even though it was generated through conventional breeding and granted patent even though European Patent Law does not grant patents for conventional breeding. With the new patent, Monsanto can block access to all breeding material inheriting the resistance derived from the Indian melon. The patent might discourage future breeding efforts and the development of new melon varieties with more resistance to the virus. The opposition to the melon patent has also garnered support from the Berne Declaration (Switzerland), Gene Watch (UK), Greenpeace (Germany), No Patents on Life (Germany), Misereor (Germany), Development Fund (Norway), Swissaid (Switzerland) and Réseau Semences Paysannes (France). Since March 2011, more than 250 organizations have signed the petition asking the European Patent Law to exclude breeding material, plants and animals and food derived thereof from patentability.

Third, a significant fight has led to filing of charges against Monsanto over its Bt eggplant. In 2012, the Environment Support Group filed a lawsuit against St.Louis based Monsanto. The group claimed that Monsanto had used six local varieties of brinjal/eggplant to create its Bt Brinjal (articles.mercola.com). Claiming this to be a ‘stealing of indigenous knowledge,’ a violation of biopiracy laws in India under the Biological Diversity Act of 2002, the chairman of the National Biodiversity Authority, Balakrishna Pasupath has recently filed a charge-sheet against Jalna-based Maharashtra

Hybrid Seed Company (Mahyco) and Monsanto (indiaenvironmentalportal.org.in). This is the first ever such case against Monsanto. The main charge is that Monsanto had not gotten permission to use the natural varieties of eggplant before modifying them for its Bt. version. Monsanto claims that Mahyco used the Cry1AC gene, a type of Bt. toxin, by accessing it from Monsanto and working in collaboration with a host of public sector institutions. But, critics point out that Monsanto owns 26% of Mahyco and has a separate joint venture Mahyco Monsanto Biotech Ltd. which handles its business related to Bt. Hence, it had ample opportunities to pursue its course of biopiracy.¹⁹

All the above mentioned facts point to the inability of the private laws of CSR to act as a checkpoint against misuse of corporate power and the need for state monitoring and regulation. Under conditions of free trade, standardized IPR instead of raising the specter of innovation has provided corporations with the perverse incentive to steal indigenous knowledge and convert them into standardized patents. Hence, customized IPR like process patents might be a better option for India to enable innovation for women. Such customization would be sensitive to complex land-use and preservation patterns and processes and uncodified knowledge systems of India.

Neo-medieval Governance of Forest Land

Despite biopiracy and the Indian government's efforts to save traditional knowledge, there are paradoxes in its attitude and behavior towards tribal folks. Neo-medieval

¹⁹ Some GM crops have to be used with Monsanto's herbicide Roundup but in Bt. brinjal's case, the crop was designed to produce its own pesticide internally. Critics point out that such a toxin when ingested, particularly by pregnant women lead to inflammation, the root cause of common diseases such as diabetes and heart cure (articles.mercola.com). Bt. brinjal has been banned by the Indian government due to push-back from the public sector (Alam, 2011), and so for the time being its harmful side effects have been avoided.

governance represents a contest between state forces and market forces and a contest between the state and its people. On the one hand the government seeks to protect traditional knowledge from being exploited commercially by people who do not compensate the knowledge holders. On the other hand, the government undertakes actions that defeat the purpose of protecting the tribal people's welfare. First, the GOI itself seeks to use knowledge resources such as forest and forest land for commercial purposes. It also seeks to conserve land by itself rather than delegate it to those with the best resources to do so - the tribal people. In order to achieve the twin goal of conservation and utilization for commercial purposes, the GOI denies access to forest lands to tribal folks and coercively takes land away from the tribal people. The paradoxical attitude of the GOI thus arises from two sources. First, there is the government's effort to commercialize forest lands. Second, there is the governments' effort at conservation of forest lands.

First, the GOI coercively acquires land for commercial purposes. The GOI often colludes with corporations to develop tribal lands for commercial purposes, as in the case of development of Special Economic Zones. According to Walker (2009), more than 500,000 hectares of forestland was seized for development projects, between 2001 and 2006 more than the previous 20 years aggregated together. Such land grabs have contributed to the deterioration of the tribal situation as it has not been accompanied by provision of healthcare. Thus, on the one side the government seeks to protect folk knowledge and on the other it seeks to prevent the very welfare of the people that it seeks to protect from the ravages of biopiracy.

Second, to conserve forests, the government denies tribal folks access to forests for NTFPs which are critical for the production of medicinal remedies. Beyond NTFPs, the tribal people are denied access to forest land for cultivation of medicinal crops which includes food crops. Without access, the tribal folks cannot use their traditional knowledge of conservation of forests. This paradoxically leads to denudation of forests in the presence of knowledge that can be used efficiently to protect forests. Lack of access also leads to insurrection, for justice, by the tribal people.

Given the paradoxical goals of the GOI and the tribal reaction to it, it is important to look at some of the forest laws in India. In neo-medieval governance such laws are critical to understand the nature of governance at the mezzo-level. The GOI also has to pay attention to macro-level norms and laws of conservation of forest lands such as the international norm of Reducing Emissions from Deforestation and Forest Degradation (REDD). The actualization of laws and norms at the macro and mezzo level of governance has unfortunately led to violence at the micro level as they are perceived as non-beneficial for the welfare of tribal people. The GOI has tried a variety of ameliorative measures to counteract the violence, but so far, such measures have failed to deliver peace.

First, let's look at the GOI's rationale for and efforts at conservation. There is no doubt that medicinal plants need conservation. However, the GOI's rationale for conservation is for the purpose of better exploitation of such plants for commercial purposes. GOI's efforts are not directed towards delivering the fruits of its conservation efforts by providing for free medicines for ameliorating the health conditions of the tribal

poor. By denying access to forests, for purposes of conservation, the GOI prevents the tribal poor from being self-reliant and using their knowledge to cure themselves.

India's medicinal plants are under threat of becoming extinct. According to Zoramsangi (2010), 90% of India's medicinal plants that are consumed and exported are found in forest habitats. Currently, local communities all over India use 8000 species of medicinal plants and an estimated 40,000 herbal formulations. Such plants are gradually becoming extinct. 90% of India's medicinal plants supply to international market is from wild stock, leading to serious depletion (Ganeasn and Bhatt, 2008). In India, 960 medicinal plants are reported to be in trade, out of which 335 wild medicinal plant have already been assessed to be Threatened or Near Threatened (such as the *Podophyllum hexandrum* which is used for chemotherapy) in one or more of 17 states in the country; 178 red-listed Threatened species are still being traded in high volume; and some species are traded despite being on the GOI's 'negative list of exports' and on the list of Convention on International Trade in Endangered Species of Wild Fauna and Flora (Ved and Goraya 2011). Hence, forest conservation is critical.

Given the threat of extinction, the GOI has been focusing heavily on conserving and propagating improved stock of medicinal plants. So far, 20,000 medicinal plants have been recorded. The GOI with the help of international organizations such as the International Union for the Conservation of Nature and Natural Resources, World Wide Fund, has established national parks, wild life reserves and botanic gardens to ensure in situ conservation of wild life and plants. It has also used biotechnology to bio-prospect for genetic materials and conserve the material ex situ using tissue culture, in vitro

propagation methods, protoplast fusion, embryo transfer, cryopreservation, and gene banks. These actions have helped identify medicinal plants of economic value and through domestication have helped to obtain uniform and high quality materials for export (Joshi et al. 2010).

Conservation of medicinal plants is highly centralized in India with the GOI controlling access to forests. The GOI has set up National and 35 State Medicinal Plant Boards (NMPB and SMPB) to conserve the medicinal plants documented in the ancient texts. Between the periods of 2001-2006, the GOI has sanctioned 4254 projects under two major schemes, promotional and contractual farming. In promotional category projects include cultivation and establishment of herbal gardens; in situ-conservation; raising of quality planting material; research and development including biotechnology or tissue-culture, genetic, molecular and chemical compound studies, and pathological studies; dissemination of information; education and communication; marketing and value-addition. In the context of commercial or contractual farming, the NMPB projects seek to work with various actors including NGOs²⁰, pharmaceutical companies, recognized private research institutions, and self-help women's groups for cultivation and value-addition through semi-processing of products (Kala and Sajwan 2007).

The thrust of GOI's conservation is more about commercial exploitation of medicinal plants, rather than delivering the fruits of such conservation as medicines for ameliorating the health conditions of the poor. According to Vashist and Karan (2003),

²⁰ For example, under the guidance of the Federal/Union Minister of Forests, Dr. Jayaram Ramesh, the NGO FRLHT has currently been involved in the Greening India Mission and conservation of medicinal plants (envis.frlht.org).

preservation of India's 19.39% of forest area is critical. However, this preservation has to go beyond preserving germplasms in gene banks, investigation in pharmacology and biotechnology through the Council for Scientific Research and regional laboratories. The GOI needs to allow the tribal people, who have the best knowledge for conservation, to conserve medicinal plants.

Now let's look at the issue of land grabs for commercial exploitation. Despite GOI efforts, instead of forest land preservation, forests are still being depleted and land access for tribals is being denuded through land grabs. Typically land is grabbed in the name of national interests. Such national interests are, for example, vested in issues of raising plantation for timber-logging and bio-diesel/bio-fuel (Kher 2005); conservation efforts to create carbon-sink projects in tune with the demands of the international regime REDD+ (Chtire 2011) as is reflected in the National Action Plan on Climate Change adopted by India in June 2008 as part of Greening India Mission; creation of Special Economic Zones (SEZ) for industrial development [spaces acquired for private capital to set up industrial enclaves at low cost], (Oza 2010); development of nuclear projects for electricity generation (Monroe 2011); building of dams for generation of electricity; increasing agricultural land under cultivation, tourism, and so on.

The loss of access to forests due to land grabs impacts women severely. According to feminist Krishna (2007) sustainable livelihood of women involves the means of gaining a living through tangible resources and stores, intangible assets of claims and access as well as acquiring actual livelihood capabilities including coping capabilities, opportunities and daily-life substantive freedoms from oppression. Often

such livelihood access is restricted by three factors. First, women are deprived of legal as well as traditional, customary land rights by restrictive forest access. The professed aim of technocrats in undertaking such activities is 'scientific' modes of conservation and proper 'productive' usage of forest-land (Poddar et al. 2011). Second, there is often arbitrary or non-democratic or highly partisan interest-oriented state-regulations on land use (Kennedy and King 2011). This tends to be a reflection of the elite capture of state resources, governance structures and development processes. Third, there occur forcible state acquisitions of land and violent evictions of traditional dwellers from the 'occupied' land in the name of national interest (Ramdas and Ghotge 2007). Such land grabs deprive women of livelihood, break up their social networks and deprive them of their natural and social capital. When such deprivation occurs, efficient human capital cannot be formed.

Commercial purposes rather than conservation seem to dominate reality in India. According to Poddar et al. (2011) and Oza (2010) in India, unfair land acquisitions for 'unspecified public purposes' and in the name of 'necessity and public good' of development has contributed to widespread land grabs. In this process, the Ministry of Environment and Forest (MoEF) designate tribal people as encroachers and dispossess them of their right to harvest NTFPs. Such actions provide forest dwellers with the perverse incentive for destroying rather than conserving forests.

The issue of forest land capture is not something new. Since the early twentieth century, forest resources, particularly through timber-logging, have been extracted for commercial and military purposes. Initially, during the colonial period it was being done by the British rulers, but after independence, the practice continued. Hence, restrictions

were placed upon the tribal people's right to hunt, graze, forage and practice shifting cultivation. In the post-independence period numerous Forest Acts and Regulations, particularly those related to Reserved and Protected Forests enforced this denial of access and penalized the tribes heavily for any transgression (Saravanan2009).

The government's stance that its regulation of forests is for the welfare of the people has meant a continuation of the strong centralization of control characteristic of colonial rule. The Indian governments' monopoly proprietary rights over forests have left the enormous administrative bureaucracy with wide discretionary powers of action. Discretionary, often corrupt actions regularly leave many people who had been occupying land for generations without any legal deed to the land and without customary access.

Let's now look at some of the laws that allow the government to alienate tribal people from their land. Tribal land alienation occurred under the banner of the National Forest Policy of 1952 as well as by non-tribal people who engaged in land grabs. National parks and wildlife sanctuaries began to be governed by the state of India. Reserved and protected forests came under sub-state control. Sub-state governments retained control of forests through staff appointment and penalization of offenders. The only lenience for the tribal people was the creation of a separate category of forests called 'communal forests' governed by local village communities or panchayats for sustainable development through committees called Forest Protection Committee. Even then, the government continued to blame tribal people as encroachers and destroyers of 'pristine' forests. (Poddar et al. 2010).

The GOI's strategy towards the tribals changed first when the National Forest Policy of 1988 recognized the symbiotic relationship of forests and tribes and restored tribes' customary right to forest resources. In 1990 this culminated in the Joint Forest Management (JFM) circular under which the MoEF sought to regularize 'unauthorized' land held by the tribal people. It also sought confidence-building measures in its efforts to engage the tribes in protection, regeneration and development of degraded forests. According to Bhattacharya et al. (2010), many public bodies and NGOs such as the Society for Promotion of Wasteland Development, Indian Institute of Forest Management, Centre for Ecological Science, Washundhara, Indian Institute of Bio-Social Research and Development, etc., were also involved in JFM, working to make it a success.

According to Ghate and Ghate (2010) the one-size-fits-all approach of the JFM circular was flawed. This was because the main ingredients of community forestry management, learning, experimentation and institutional innovation were limited by the pre-packaged objectives of JFM. For example, following JFM, empowered by pioneering environmental movements like Chipko and through innovative programs like Mahila Samakhya, all-women Van/forest Panchayats and informal women's forest committees were set up in many villages across India (Podder et al. 2011). Such movements were non-market based and such initiatives engendered good outcomes. But, with the imposition of JFM which did not provide for women-only groups, such efforts fizzled out (Pratap 2010).

JFM had mixed outcomes for overall tribal development through collective action in the sub-states of West Bengal and Maharashtra (Barnes 2010, Sarker and Das 2008). Forest cover improved but rights to access was not implemented to any significant extent. Naxalite violence continued in parts of Maharashtra like the Gadchiroli district (Ghate et al. 2009) as well as in parts of Bengal. This was because implementation of NTFP policies within the structure of JFM was highly contingent on sub-state policies as forests fall under State and Concurrent Lists rather than Federal List of the Indian constitution (Poddar et al. 2010; Lele et al. 2010). According to Bhattacharya et al. (2010) State Forest Departments often enforced bans on livelihood activities, such as shifting cultivation, fishing and extraction of NTFPs on environmental protection grounds. Simultaneously with such bans, the sub-states undertook forced evictions to enable liberalization of commercial activities. Conservation thus became a ‘good business.’

The GOI’s problems of governance of forests are complicated by its international commitment to conservation that requires more state control over forests. As part of the international Copenhagen Accord of 2009, India committed itself to deploying clean energy technology and Reducing Emissions from Deforestation and Forest Degradation (REDD+) (Chitre 2011.) Such commitments have meant that the Supreme Court of India’s 2004 ‘strict’ interpretation of the Wildlife Protection Act in terms of collection of NTFPs from national parks and wildlife sanctuaries have become stricter and contributed to further alienation of tribal people from their ancestral lands. Tribal people do not have formal title to their lands and hence, it is easy to evict them from their lands in the name of public interest like adhering to international law of REDD+.

Critics of REDD+, such as, Jha (2011), considers steps of conservation, such as REDD+, as counter-productive to conservation, even though the GOI touts it as ‘Greening India Mission.’ This skepticism arises because REDD+ leads to commodification and privatization of nature for purposes of trade. Commoditization occurs through carbon trading between the North and the South. Jha (2011) feels that carbon trading occurring as part of REDD+ is simply a method of securing property rights for heavy Northern fossil fuel users. The North gains control over the tropical countries’ carbon-absorbing capacity of forest lands while continuing their ‘right to pollute.’ This is done by compensating the South for North’s emissions through ‘emissions-saving projects’ in the South. The North implements emission-saving projects in the South, such as, creation of monocultures of plantations as carbon sinks. The South sells credits to the Northern polluters who use them to compensate for their emissions. Beyond this compensation mechanism, REDD+ creates new opportunities for corporate profit through trade. This is done through creation of commercial monocultures on forest lands. Commercial monocultures are plantations of high-value single species of trees whose timber is used for trading. All such trading comes at the price of tribals losing access to their ancestral lands.²¹

The famous eco-feminist Vandana Shiva is a strong critique of the GOI’s adherence to neoliberal policies of REDD+. She opposes the privatization and commodification of nature through conversion of forests into carbon markets as it leads

²¹ India’s commitment to neoliberal policies and creation of land-use for growth and hence, commerce rather than sustainable development has exacerbated the issue of land access and land ownership by the tribes.

to loss of access to forests for tribal people and to degradation of biodiversity of forests. The focus only on carbon sequestration, or only biomass production, as part of the project of REDD+, reduces the rich diverse forest eco-systems as they get replaced with commercial monocultures.²² Monocultures of plantations for timber-logging reduce the rich biodiversity that provides for a variety of medicinal plants (Shiva, 2013). This loss of biodiversity thus affects women. Instead of ensuring participation of women in the process of conservation, the GOI has eliminated access to forests for women.

According to Sundaresan (2011), to understand the state of tribal affairs in the context of land grabs the opinion of a leading feminist activist of tribal rights needs to be noted. Feminist activist Arundhati Roy argues that the real problem for the tribal situation is that the flagship of India's miraculous growth story has turned sour as it came at a huge environmental and social cost. As forests disappear and rivers dry up and all the water table recedes, people are up in arms refusing to believe in false promises. High growth rate and democracy have become incompatible. To get bauxite and iron-ore from hills and the forest floor and to get 85% of India's people into cities and off their land, India has to become a police state and has to militarize. To justify that militarization, it has created the Maoists as its enemy.

In India, loss of access to forests has led to the rise of militancy among the tribals. Militant uprising among the tribals in reaction to loss of their traditional domain of forests is not something new. The colonial history of forest activities was marked by

²² The UNEP initiative on the Economics of Eco-systems and Biodiversity project that the loss of ecological services from degradation of forests alone is \$2-4.5 trillion a year.

tribal uprisings which continue to this day in the form of Maoist movements, the latest being the Nandigram (Oza 2010) and Singur displacement uprising in West Bengal in response to attempts to create an SEZ (Fernandes 2007). The SEZ for a chemical hub and a car manufacturing plant was sought to be created through acquisition of highly productive rice farmlands.

According to Das (2010), land grabs provided the spark for widespread Maoist activities, covering 600 districts or 40% of the geographical area of India. According to Bose et al. (2012), the government's own investigations reveal that land alienation, poverty, illiteracy, degraded natural resources, lack of access to resources and flawed governance is at the root of armed conflicts in tribal areas. Despite its own assessment, the government instead of providing for real solutions like amelioration of poverty provided a quick sop to stop the spread of violence and to counter the pressure from huge civil society mobilization from groups like the National Forum of Forest Peoples and Forest Workers, Chipko, Kalpavriksh and Ekta Parishad (Torri 2011). The quick sop came in the form of the Forest Rights Act (FRA) of 2006.

The GOI's efforts at amelioration of tribal activities through the new law FRA, 2006 was the first genuine attempt at forest tenure reform, attempt at forest decentralization, and transfer of resources including discretionary power to elect local authorities. FRA, 2006 acknowledged a 'history of injustice,' and enabled individual and collective claims to land as property (Bannerjee et al. 2010).

According to Pratap (2010), on the measure of number of land titles granted against FRA 2006 claims, Bengal performed better than Maharashtra. Bengal had a rank

of 8 as compared to 14 of Maharashtra. Land tenure and land rights are a pre-requisite for protection of traditional knowledge of the tribal people. Hence, land rights are a critical first measure of ensuring livelihood of the tribal people and countering extremism.

Despite the promise of FRA, 2006, the reality today is very far from the ideal concessions enshrined in the Act (Bose et al. 2012). The GOI continues to be the sole extractor of NTFP surplus having nationalized the most valuable NTFPs (Lele et al. 2010). The focus continues to be on revenue maximization and garnering ‘resource rent’ rather than on welfare. The Forest Department continues to be the custodian who enforces sustainability norms and women are not granted clear rights to land, forest, water, and genetic resources. The failure to recognize and promote complex land-use patterns and facilitating such use has resulted in inefficiency in land use and ecological fragility. On top of that there is corruption, such as, the Forest Department’s non-payment to tribes for plantation-related activities (Barnes 2010).

Beyond the problem of proper implementation of FRA 2006, development of the tribals as part of neo-medieval governance is hindered by two major problems. First, remote tribal areas often do not receive development funds and resources, such as schools, health-care centers, all-weather roads necessary for access to markets (Ghate and Beazley 2007). For example, in December 2011, the GOI approved the Integrated Action Plan that would provide Rs. 55 crore over two years to 60 ST districts. But, the implementation authority of the plan was given to an unelected district-level committee consisting of collector, superintendent of police, and the forest officer, all considered by

tribal people to be the most powerful and often oppressive agents. So, development fails to reach the neediest and violent uprising continues.

Second, the enormous backwardness of the tribes has further contributed to the entrenchment of one of the scourges of rural India that has continued from colonial times - bonded labor. According to Das (2010) there are at least 40 million 'indebted' bonded laborers in India, of which 90% are low or scheduled castes (SCs) and scheduled tribes (STs), who are forced to pay off their debts to landlords through free wage labor (Brass 2011). Such bondage along with land grabs has meant increasing loss of knowledge and skill-set of the tribal people.

While government sponsored development of tribals fail to make any headway, Maoists rebels represent an alternative source of developmental governance for the tribals. As Das (2010) points out, in tribal belts the Maoists or the Naxalites are popular because they help generate equitable access to village commons and provide for other benefits such as health, rural credit, seed banks and so on. But, caught between the extremes of government's repression and implicit support of corporate militia and Maoist fighters, women are often caught in the cross-hairs of violence in the form of mass rape, mutilation and murder (Kennedy and King 2011). Such 'internal colonialism' (Kennedy and King 2011) resulting in violence is most certainly not conducive to knowledge conservation and experimentation for innovation. As violence perpetuates, medicinal plants and biodiversity continue to be lost through environmental degradation (Anderson 2010).

Some critics of the GOI's action towards tribal development feel that the recent concession of benefit-sharing for communities of knowledge holders by bio-prospectors as enshrined in the Nagoya Protocol, of which India is a signatory, is not enough. There are still problems of accountability and transparency attached with the process. Hence, access to medicine requires active social fixes to the problem of poverty (Kursar 2011).

Critics such as Ambagudia (2011) feel that STs should not be made into 'subjects of development' by any outside agency. Ambagudia (2011) feels that in the name of extending welfare projects and affirmative action to tribal people, the state is legitimizing its control over tribal resources. For STs, the main concern is not integration into mainstream society, but being treated as equal partners and having control over their lands and livelihoods. Instead of intervention, in short, governance should be about devolution of power.

Despite denying access to forest, the GOI has also actively tried to engender various developmental activities to help the tribal people. Development plans to help tribes socio-economically occurred from the Fifth Five Year Plan's launch of the Tribal Sub-Plan. Economic programs included the fields of horticulture inclusive of medicinal plants, animal husbandry, soil conservation, minor irrigation, sericulture, small or cottage industries and bee-keeping. The GOI also attempted to provide electricity, water, road connectivity, health and education facilities (Saravanan 2007). Most importantly, the GOI also established the Tribal Cooperative Marketing Development Federation of India Ltd. in 1987 for marketing NTFPs and other agricultural products harvested by the tribal communities (Lele et al. 2010).

The GOI attempted rudimentary land reforms in the 50s, green revolution in the 60s, cheap credit to the poor as part of Integrated Rural Development Policy of the 70s, health benefits under the National Rural Health Mission (NRHM) and job creation (100 days of employment with the stipulation that one-third of the hired laborers have to be women) under the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) in the 90s, to help the poor people of India.

The most important development step taken by the GOI is the passage of MGNREGA. According to Dheeraja et al. (2011), the GOI's program of MGNREGA in association with the local government seeks to also address livelihood issue. The program's salient features are water conservation, afforestation, creation of irrigation facilities, land development, renovation of traditional water bodies and rural roads, and so on. The program is sought to be implemented by Panchayati Raj institutes (village-level governments) and relevant government departments such as Social Forestry, Horticulture (which covers medicinal plants), Irrigation, and so on. The entire cost of wages of unskilled workers and 75% of cost of material and wages of skilled and semi-skilled workers, administrative expenses, worksite facilities, etc., is provided by the federal government. The local government provides 25% of the cost of material, unemployment allowances payable under the scheme and state level administrative expenses. MGNREGA specifically aims at providing food security for the poverty-stricken tribes.

Despite well-intended GOI efforts, the tribal condition have steadily declined as land alienation has increased. According to the 2001 census, among the tribal people living in rural areas agricultural cultivators declined to 45% while the category of

agricultural laborers rose to an alarming level of 37%. Often poverty forced the tribal people to sell off their land to repay their debt and meet their social, religious, medical and consumption needs. Female illiteracy remained high at 65%. Illiteracy along with lack of land prevented women from accessing micro-loans or development assistance programs to raise their productivity and protect themselves and their children (Saravanan 2009). The government programs often do not reach the tribal population due to bureaucratic corruption, elite-capture within the tribes, and cross-cutting demands of various low-caste groups with power (Dheeraja et al. 2011).

The poor implementation of FRA 2006 has dashed the hopes of the tribes for a better livelihood and contributed to increased insurrection. Under such conditions, knowledge flow among women folk and their networks get disrupted and innovation and conservation is put on the back-burner.²³ In fact, violence and poverty brings about extreme crisis of health among the tribes. This is what is explored in the next section.

Health Welfare of Tribes in India

According to Shrivastava et al. (2013), India has one of the largest tribal populations in the world. The tribal population constitutes 8.2% of the country's population according to the 2001 census (Nanjunda and Dinesha, 2011). These people dwell deep inside forests and mountains, far away from mainstream society. Compared to 72% of the national population, 90% of tribes live in rural areas. The tribal regions tend to be socio-economically backward and are highly disease prone. The misery of the tribes

²³ Also critical to note is the fact that the dominant paradigm claims that TRIPS provides for flow of foreign direct investment (FDI) that would spur growth. Violence is not conducive to flow of FDI.

is compounded by poverty, illiteracy, poor sanitation, lack of safe drinking water, etc. They tend to be the population that is most exploited, neglected and highly vulnerable to disease. They have high degrees of malnutrition, morbidity and mortality. 47.3% of tribes live below poverty line in rural areas compared to national average of 28.3% (Shrivastava et al. 2013). Despite their high store of traditional knowledge, health of the tribal people is dire. Under such conditions, neither efficient human capital formation nor innovation is possible.

Among the tribals poverty and diseases are intertwined issues. According to IBRD Report (2011), 2004-05 official poverty estimates show that the ST population represents 44.7% of the poor compared to 37.1% of SCs being poor and 22.7% of Other Backward Classes being poor in rural areas. STs hence, are poorest of the poor. This poverty has meant that they have high incidences of alcoholism, greater prevalence of TB, leprosy, HIV/AIDS, visual impairment from avoidable causes such as proper diet and surgeries, respiratory diseases and high anemia levels including genetic diseases like thalassemia due to inadequate food intake (Shrivastava et al., 2013). The tribes also suffer a lot from gastrointestinal disorders, particularly dysentery and diarrhea leading to further morbidity and malnutrition. All such problems are diseases of the poor. However, the disease situation is worsened by the fact that there is a high degree of inbreeding and therefore high prevalence of genetically inherited diseases (Nanjunda and Dinesha 2011). To complicate the issue of poverty and health, the tribes' lack of work and economic resources to pay for health and food means that they are chronically anxious about dealing with health problems.

The tribal health situation is deprived of modern amenities. In tribal areas there is inequitable distribution of facilities for primary and maternal healthcare services, non-availability of health staff in the health centers, non-availability of essential drugs, equipment and an overall lack of health infrastructure. Often lack of local transport and money required for accessing such transport; huge wait time at the health center and timing of facilities; prevents tribal people from accessing healthcare (Shrivastava et al. 2013). Health, particularly medicine is technically supposed to be free for the tribal people but medicines are often not available. This is because medicines are sold at private dispensaries and pharmacies, having been funneled out of hospitals by corrupt officials and staff (Dutta and Dutta 2013).

There is a serious lack of access to health communication because the tribes do not have resources such as TV or radio on which health announcements and advertisements are made. Their illiteracy also prevents them from understanding such communicate. Even when they manage to access hospitals and other health centers there is a lack of counsellors to explain the health issues and remedies in detail. The government sanctioned Accredited Social Health Activists (ASHA) often fails to reach the necessary population. Government schemes, such as, Janani Suraksha Yojana or safe motherhood intervention also fall short of target. Overall marginalization, both structural and communicative has intensified the misery of the tribes

Given the dire health scenario among the tribals, it is critical to look at certain statistics that highlight the worse off conditions of STs in comparison to other repressed groups in India. Among tribal women, the likelihood of having received care from a

doctor is very low. This is evidenced by the fact that by the estimates of National Family Health Survey-3 (NFHS 2006) compared to all-India 50.2% attendance only 32.8% of STs got access to doctors. According to NFHS-3, only 17.1% of ST women were assisted by doctors at birth compared to 47.4% attendance for mainstream high castes in India. Compared to Other Backward classes (Others or OBCs), another repressed group in India, who had 22.8% proportion of pregnancies with no antenatal checkups, 37.8% of STs did not have access. Infant mortality rate per 1000 live births is 62.1 for STs while it is 57 for others. Only 31.3% of ST children received primary immunization compared to 53.8% for Others. 11.5% of STs received no vaccination as opposed to 4.3% for Others (Shrivastava et al. 2013).

According to Kennedy and King, (2011) the ST situation is worse than that of the SCs in India, another oppressed section of India. Based on NFHS 2005-06, the authors point out that while the percentage of births not delivered by a skilled provider is 59.4% for SCs it is 74.6% for STs. While the infant mortality rate per 1000 live births is 66.4% for SCs, it is 62.1% for STs. Under-5 mortality rate for SCs is 88.1% while for the STs it is 95.7%. The percentage of children without full immunization is 60.3% for SCs while it is 68.7% for the STs. SCs have 47.9% of their children as undernourished (weight for age) while STs have 54.5% undernourished children. Most importantly, SCs have 58.3% of women with anemia while STs have 68.5% of women with anemia. Undernourished and anemic women tend to be harbingers of undernourished children burdened by genetically transferred diseases such as thalassemia and sickle cell anemia (Mohindra and Labonte 2010). These statistics are proof that STs have the most miserable lot in entire

India. The only shining point among the STs is that their sex ratio is more favorable to women than the national population (972/1000 men vs. 927/1000) [Shrivastava et al. 2013].

According to IBRD Report (2011), in 2005, 40.5% of ST mothers had three or more antenatal visits, 32.2% had prenatal care provided by doctor and 54.8% had ever used contraception. In comparison, 44.3% of SC mothers had three or more antenatal visits, 41.2% had prenatal care provided by doctors and 63.1% had ever used contraception. Similarly, among OBCs 48.2% had three or more antenatal visits, 47% had prenatal care provided by doctor and 61.9% had ever used contraception. In 2005, among the SCs, the percentage of children under 5 was 21.6% and under-5 deaths were 24.6%. Among OBCs the respective percentages was 41.8% and 39.6% and among STs, it was 11.7% and 13.9% respectively. Thus, the condition of the STs was worst among the poorest of the poor.

According to Mahindra and Labonte (2011), STs are afflicted by a prevalence of chronic undernutrition, micronutrient deficiencies of iodine, anemia, malaria and TB, and alcohol abuse and chronic tobacco smoking. In 1998-99, the percentage of women with anemia in total population was 51.8% and for the STs the figure was 64.9%. The percentage of deliveries by skilled providers was 42.3% for the total population, while for STs the figure was 23%. The percentage of women who had heard of HIV/AIDS for the total population was 40.3% while for the STs it was 17.2%. In 2005-06 these figures in the respective indicators changed for the total population to 55.3%, 46.6% and 60.9%. In comparison, the figures for the STs were 68.5%, 25.4%, and 38.6%.

According to Sonowal (2010), tribal women and children mortality is affected majorly by protein calorie malnutrition. Such malnutrition due to lack of access to meat, eggs and fish have multiplicative rather than additive effects. Lack of land contributes significantly to malnutrition. A family of 5-6 needs agro-products such as food-crops, vegetables and fruits cultivated from at least 5 acres of land to sustain the whole year. Forced to migrate, and work under harsh conditions, tribals then have 40% malnourished children. Modern wage labor and higher earnings thus does not translate to better health. The author also points out that Maharashtra has more than 60% prevalence of underweight and stunted children in the ages of 1-5. Children in West Bengal are most vulnerable to vitamin A deficiency of above 6% that increase susceptibility to infections causing blindness and stunting. 95% of Bengal's children suffer from anemia because of iron deficiency.

Health Welfare of Tribes in Maharashtra

Given the fact that Maharashtra has the second largest concentration of ST population and is considered a high income state with a per capita income per annum of 32,170 (Khandare et al. 2008), it is important to note the overall situation in Maharashtra and some examples of the tribal situation. It is important to note that health is a state subject (Shrivastava et al. 2013) and hence, what happens in the state is significantly attributable to the state's actions. Currently, Maharashtra government spends only .48% of GDP on health (www.indianngos.com). In 1996, Maharashtra's health expenditure as a percentage of total expenditure was 4.56%, but, by 2005 it had declined to 0.93% (Jain 2010).

According to Pitre et al. (2009), Maharashtra has grown phenomenally in terms of economic growth but, has also experienced growth in poverty. From an average 5% per year growth from 1993-2001 growth increased to 7.8% in 2002-2007. But, despite growth, the oppressed sections, particularly the STs, have miserable health equity because of poverty.

To understand the situation of the STs, it is important to track some statistics. According to IBRD Report (2011), in Maharashtra, the poverty levels of STs actually rose between 1993-94 and 2004-05 from 53.1% to 54.2% while the rates for all groups dropped from 36.8% to 30.6%. Hence, it is not surprising that across Maharashtra compared to other groups, STs have high incidences of severe stunting, stunting, severe wasting, wasting, and severe underweight and underweight. For example, the respective figures for SCs for the mentioned incidences for under-5 children are 23.4%, 55.2%, 6.6%, 20.2%, 13.5% and 41.7%. In comparison, the corresponding figures for STs are 30%, 57.8%, 5.6%, 18.9%, 21.2% and 53.2% (Pitre et al. 2009).

Beyond broad-scale statistics it is important to track micro-studies to understand the tribal situation. Following are some examples of micro studies. Menon et al. (2011) conducted a cross-sectional study in Nagpur district of Maharashtra. The study assessed the existence of concurrent micronutrient deficiencies in non-pregnant rural and tribal women between the ages of 18-30. The study found that zinc, vitamin B12 and iron constituted the principal micronutrient deficiencies in these women. 66% of women has anemia. Hence, 63% of women have a Body Mass Index (BMI) of less than 18.5 kilogram. What is interesting to note is that compared to 21% of other rural women with

a concurrent micronutrient deficiency of zinc and anemia, 38% of tribal women have the same affliction. According to Kate (2001), due to such micronutrient deficiencies, goiter of various grades is endemic in some tribal areas of Maharashtra.

According to Khandare et al. (2008), during the period of 2004-05 there were widespread reports of malnutrition deaths among STs in Melghat region of the Thane district, despite efforts being made under the National Nutrition Policy and the MGNREGA. The authors conducted a study in Thane district which has 96% ST and 4.2% SC population. They found that 35% of lactating mothers were found to be anemic and 67.5% were found to have less than 20 BMI. In pre-school children, ages 0-6 years, the overall prevalence of underweight is about 69% and stunting is 60%. During the period 2005-06, in the area, out of 104 under 6 children who were hospitalized died due to reasons such as premature for death, premature for weight, infectious aseptica, septicemia, meningitis, pneumonia, TB and congenital heart disease.

Meshram et al. (2011), found problems such as underweight for age among pre-school under-6 children is common in 8 tribal districts of Maharashtra. The authors found that among children, 64% is underweight and 29% is severely underweight; 61% is stunted and 30% is severely stunted; and 29% is wasted and 7% is severely wasted. Illiterate mothers had higher incidences of having underweight children. Such facts held despite government programs such as Integrated Child Development Scheme, Public Distribution Scheme for providing subsidized grains of rice and wheat, mid-day meal schemes such as Anthyodaya Anna Yojana Scheme.

According to Vlassoff et al. (2012), India's tribal population is at considerable risk of sexually transmitted diseases, particularly HIV/AIDS due to their relatively open sexual mores compared to traditional Indian society. The authors conducted a study of tribal and other rural people in the Satara district of Maharashtra. Compared to the all-Maharashtra infection rate of 0.5%, this district had a very high incidence of 2% HIV positive women. Tribal people were found to have much less knowledgeable about HIV than rural respondents so that they had high stigma against people with the disease, particularly against women. Such stigma included refusing to eating food prepared by someone or buying food from someone who has been infected by the disease. This reflected lack of counseling for HIV-infected people and spreading of more information about the disease in the communities. Hence, it is not surprising that the authors conclude that fear and denial in the tribal communities and an increase in high-risk behavior indicate that tribal communities are in early phase of an HIV epidemic. STs are also an emergent high-risk group because of displacement and migration into mainstream society for employment opportunities (Nanjunda and Dinesha 2011).

Despite the pathetic scenario of tribal health, help for tribals comes in the form of NGOs' work in tribal areas. For example, the community-based-health-care work done by Rani and Abhay Bang as part of their NGO society for Education, Action and Research Community Health (SEARCH) in the troubled Gadchiroli district is exemplary. They have attempted to tackle a major problem facing women – gynecological problems and issues related to pregnancy and childbirth. They have pioneered the creation of a home-based package of neonatal care that can be delivered by trained and equipped

village women. The women diagnose pneumonia, resuscitate babies who struggle to breathe after birth and administer vitamin K injections (Shetty 2011). According to Bajpai and Dholakia (2011), SEARCH village health workers also conduct post-natal and nutrition counseling and monitor child growth. Such activities led to a decrease in birth of low weight babies, infant mortality and co-morbidities such as sepsis, asphyxia, hypothermia and feeding problems. The Bang husband-wife duo also successfully lobbied the local government to enforce alcohol prohibition in the district as it significantly impacts the tribal women's household relations, choice and livelihood capabilities (Shetty 2011).

Another NGO that works with rural and tribal health in Maharashtra is the Comprehensive Rural Health Project (CRHP). CRHP Started in 1990 with community-based program in the village of Jamkhed in the Bhandardara district to tackle tribal health problems. Given its success in this venture, CRHP was approached by the Maharashtra state government in 2004 to develop similar programs in seven other tribal districts. Their main objective has been to promote holistic health through both preventive (health education) and curative approaches especially for women and children. For complicated diseases such as TB, leprosy and HIV/AIDS that require in-patient hospital treatment, the local health workers of CRHP refer to the government Primary Health Care centers and hospitals. But, trained health workers can take care of basic issues such as child health, nutrition, safe deliveries and hygiene. In trying to achieve such activities CRHP has also focused on creating self-help women's groups (www.jamkhed.org).

NGOs working with government structures have made some changes. For example, MAHAN conducted a study in the Melghat, Thane region of Maharashtra and found 50% children were underweight. Under its recommendation, and directive by the state High Court, the government now provides special facilities such as ‘Village Child Development Center’ to serve the underweight with appropriate diet intervention, instead of merely hospitalizing them. MAHAN also brought about changes in antibiotic use of ASHA workers. The workers were not advised to give antibiotics to children in the villages. Under MAHAN’s recommendation, the state government has now approved the government workers’ usage of drugs like Hematoxylin for children suffering from pneumonia and neonatal sepsis. This has helped to reduce child mortality (www.indianngos.com). Despite such help, the overall figures stated above, shows that the tribal condition is still very dire.

Health Welfare of Tribes in West Bengal

According to Jain (2010), Maharashtra’s economic growth rank of 3 is higher than West Bengal’s rank of 10. Also according to Kumar and Singh (2010), Maharashtra ranks higher than Bengal in economic status, with the former having a rank of 15 and the latter a rank of 10. Despite the differences in economic rank, in 1996, Bengal’s contribution to health was higher than Maharashtra at 6.43%. By 2005 Bengal’s health contribution had declined to 4.93% (Jain, 2010) but, it was still higher than that of Maharashtra. Despite the higher contribution to health, like Maharashtra, West Bengal tribes suffer from dire health conditions.

In West Bengal, tribes suffer from severe malnutrition and chronic energy deficiency (CED). According to Das and Bose (2011), NFHS 2006 point out that the prevalence of under-nutrition in rural Bengal is 44.9% among men and 38% among women. NFHS 2001 points out that Bengal has the highest rate of CED among adult tribal females. This dire health situation is due to crisis of livelihood among tribals. Inadequate intake of energy due to undernutrition associated with high levels of physical activities and infections leads to morbidities from infections due to suppressed immune functions. Women with CED tend to have low birth weight and adverse pregnancy outcome. The survival of infants, their postnatal growth and development depends significantly on their birth weight. Since birth weight tends to be low, there is severe stunting, wasting and underweight issues among children.

Bose et al. (2005) undertook a study of the Kora Mudi tribes in Bankura district. Within the sampled population, the extent of BMI (less than 18 kg/m² as per the World Health Organization [WHO] criterion) as an indicator of adiposity was very low and hence, malnutrition was found to be very high at 52.2%. The frequency of under-nutrition was found to be higher among women (56.4%) than men (48%). Women's under-nutrition affects the health of children as is evident from the following study.

Bisai and Mallick (2011), also studied the Kora Mudis. The authors studied 59 boys and 60 girls aged 2-13 in West Midnapore district. In the two villages they studied, there were no health centers and the villages were plagued with malnutrition. In the category of moderate undernutrition, the authors found that 35% girls as compared to 39% boys are underweight; 20% girls as compared to 30.5% boys are stunted; and 15%

girls as compared to 27.1% boys are wasted. In the category of severe undernutrition 13.3% of girls as compared to 18.6% of boys are underweight; 23.3% girls as compared to 25.4% boys are stunted; and 1.7% of both boys and girls are wasted. These figures reveal that there is no gender discrimination among the tribe with regard to children. But, combining the categories of malnutrition reveal that overall prevalence of underweight is more than 30%, stunting is more than 40% and wasting is more than 15%. This indicated a critical situation by the WHO standards.

Following are some more examples of malnutrition and CED. According to Bose et al. (2008), the Lodhas and Bhumijis of West Midnapore district suffer from high chronic energy deficiency (CED) due to a 'steady' underweight situation. Lodha males have a BMI of 19.47 kg/m² and the Bhumijis have a BMI of 18.65 kg/m². With BMI at 18.4, CED at 58.9% is common among the women of the Bhumij tribes also.

According to Bisai and Bose (2008), Dhimal tribe in Darjeeling district have women's BMI at 19.1 and CED at 46.4%. Among the women of the Santal tribe in West Midnapore district BMI is at 19.3 and CED at 41.8% and among the women of Bankura district BMI is at 18.7 and CED is at 52.5%.

According to Das and Bose (2011,) Santal women of Purulia district with most severe class of CED III and BMI of less than 16 account for 32.49% of the population. Overall, 63.4% of women are under-nourished and have CED compared to 30.6% of men.

Beyond problems of malnutrition and CED, rural and tribal West Bengal is also plagued by pollution of main water bodies and groundwater depletion leading to

problems of arsenic and fluoride poisoning. Arsenic poisoning leads to development of skin lesions, skin cancer, lung cancer, diabetes and cardio-vascular disease (Chung et al. 2006). By ingesting excess fluoride tribals are affected by fluorosis disease and hence, suffer from yellow cracked teeth, joint pains, crippled limbs and quick aging (Bhattacharya and Chakrabarti 2011).

In both the states of Maharashtra and West Bengal, malaria is a scourge among the tribal population. According to Bhattacharjee and Bhattacharjee (2011), the incidence of *P. falciparum* malaria is meso-hyper-endemic (90% or more) among such population. This adds to the burden of CED. Overall, among the Indian states and Union territories, Maharashtra and West Bengal were ranked 3 and 4 respectively in terms of the highest mortality rates in 2010.

NGOs in India typically have to deal with state machinery and hence, local politics in serving for tribal health (Nanjunda and Dinesha 2011). The tribal health problem in Bengal is sought to be alleviated mostly through accredited social health activists or ASHA workers because of the history of Communist rule that dictates the predominance of government infrastructure over private entities work. Nonetheless, there are NGOs working independently or with ASHA. For example, Mallarpur Uthanu help Santhali children cope with education through their own language, provide health-care and raise community awareness towards sustainable development of the region. Similarly, Nutanhat Development Society covers 52 villages in its work. It provides for health facilities and deals with unclean environment (www.ashanet.org).

Conclusion

The tribal situation in India under neo-medieval governance is dire. Despite having vast stores of knowledge about health, their health equity lags significantly. The reasons are multiple, but failure of governance in terms of providing access to forests, the resource-base of tribal knowledge is a significant cause of tribal degeneration. According to Xaxa (2004), the strife between the state's demarcation of STs in terms of communities and women's individual right to land has also made growth in women's knowledge of medicine tenuous. Nanjunda and Dinesha (2011) feel that the lack of interest and resources in the government sector has widened the treatment gap for tribals' health. Some of the gap is filled by NGOs who work in specialized areas such as mental health, schizophrenia and psychotic conditions, dementia, drug and alcohol abuse, etc. among the tribes in both preventive and curative capabilities. NGOs are also campaigning for promotion of herbal plants in kitchen-garden and nurseries so that traditional medicinal practices can thrive. They are also encouraging tribal youth to take up the practise of traditional medicine as livelihood option and for working with government scientists for research and development of new drugs. The hope is that the tribes will benefit increasingly from such collaborations through commercial use of IPRs and be able to counteract biopiracy.

All of the field-work done amidst tribal people note either of two things. First, the rich knowledge base and second the dire health conditions. Most of the studies that track the knowledge-base makes recommendations for protection of IPR as a critical path that must be undertaken to ensure that there is benefit-sharing and that biopiracy is avoided.

However, these studies do not look at the fundamental underlying problems that arise from poverty and lack of development of tribal people. Studies that deal with health issues, merely document the dire health conditions and do not tie this into problems of human rights and justice issues. None of these studies deal with the thrust on growth of knowledge economy and lack of distributional issues that impact the tribes negatively. No studies have brought together the issue of knowledge economy, neo-medieval governance and the negative impact of free-market on human rights.

CHAPTER THREE: CODIFIED KNOWLEDGE ABOUT TRADITIONAL AND MODERN MEDICINE AND HEALTH IN INDIA

Introduction

The paradigm of knowledge economy, as propounded by neoliberals, promises growth and welfare. Such growth and welfare is achievable if government withdraws itself from providing public services and instead the market is allowed to provide for private services. With the market unleashed, there would be free, unregulated trade in goods and services. To incentivize free trade in a regulation-free free-market, governments would have to grant patents to private corporations for their products. Such patent incentives would encourage private corporations to invest in local economies and there would be flow of FDI. Such incentives would also encourage local population to engage in high-value productive activities and thus, there would be enhancement in human capital. With such activities on the rise, wealth would trickle down in society and there would be slow but steady development of all-round welfare. Welfare would particularly manifest in terms of access to healthcare including access to medicines. In

short, the assumption of knowledge economy that there will be perfect allocation and mobility of factors of production will hold and equity will trickle down.

In the context of pharmaceutical industry, patent protection is expected to deliver growth and welfare. Growth would create an expanding thriving medical sector that provides all kinds of essential medicine at affordable prices. Access to such medicines is expected to ensure the welfare of the poor. However, there is an inherent paradox involved in such a vision presented by knowledge economy. Patent protection implies monopoly protection of a product for twenty years. The monopoly protection is given to enable the pharmaceutical industry to recoup its research and development costs. It is a reward or a right given to pharmaceutical corporations for the industry's work at creating life-saving medicines.

Monopoly protection of pharmaceutical products inherently leads to very high prices which the poor cannot afford. Moreover, the incentive to make profits under monopoly conditions means that diseases of the poor do not get researched and medicines for such diseases do not get discovered. This is because the poor cannot afford to pay high prices for such medicines that would inevitably become patent protected. If the poor cannot afford medicines and are afflicted and dying, they cannot develop themselves as productive economic agents. Hence, the vision of growing human capital under knowledge economy cannot be achieved. Welfare under patent protection thus becomes problematic.

Knowledge economy is embedded in neo-medieval governance. In neo-medieval governance there is tension between market and the state in their efforts to define justice.

In neo-medieval governance human rights is a critical concern. How do various actors with different rights fulfill their responsibilities for ensuring human rights? For example, under international law, under the UN Covenant on Economic, Social and Cultural Rights treaty, states have the primary responsibility of ensuring the highest standard of health and ensuring that the poor and the disadvantaged have access to medicine. This responsibility is becoming increasingly difficult to fulfill, particularly by states of developing nations. This is because their right to regulate markets to ensure better public health outcomes is increasingly being curbed. States' capability of procuring medicines at cheap prices so that they can distribute it to the poor as part of providing health services is increasingly being curbed as they withdraw from regulating the market. Moreover, as states withdraw from regulating market, unethical and irresponsible practices of corporations are on the rise. Scholars are hence, increasingly advocating for responsibilities of corporations.

Corporations have the right to make profits. There is corresponding need for corporations to have responsibilities for ensuring the right to health by providing access to medicine for the poor. There is an increasing moral imperative for corporations to become good corporate citizens who are responsible to the society in which they are embedded. Increasingly there is scrutiny of corporations' CSR in terms of non-financial responsibility. Such responsibility goes beyond utilitarian commitment to shareholders to make profit. It requires that corporations provide for access to medicines for the poor by donating medicines and researching diseases of the poor. It also requires that corporations do not engage in unethical marketing practices such as selling unsafe drugs in developing

countries. CSR activities and moral character of corporate activities are increasingly coming under public scrutiny and there is pressure on corporations to be good citizens.

The social pressure on corporations has led to 'soft' non-binding voluntary codes of conduct as enshrined in the international UN Global Compact. However, individual CSR codes are vague, ambiguous and non-benchmarked in terms of best practices in the industry. When international law does not provide for hard binding codes of conduct backed by sanctions, as is provided in TRIPS and enforced by the WTO, it is difficult to expect constant ethically correct behavior from the corporations. Consequently, the empirical reality is mixed in terms of corporate behavior. There have been some attempts by corporations to provide for access to medicines through donations and support of the research of the diseases of the poor. On the other hand there is a lot of anti-poor actions undertaken by the corporations that undermine this good will. This is because knowledge economy is driven by rational greed of accumulation. It is not a public institution invested with the responsibility for achieving pure justice. Consequently, powerful actors like corporations tend to abuse their power and deprive the poor. Hence, it is increasingly critical that the state steps in to provide welfare for the poor. The market has failed to provide for perfect allocation of resources according to the needs of the poor and state intervention has become critical to achieve equity.

Based on the above outlined understanding of knowledge economy and neo-medieval governance, this chapter deals with growth and welfare. Growth of the Indian System of Medicine and growth of the pharmaceutical biotech sector is explored. The overall assessment is that there has been significant growth in the pharmaceutical sector.

However, there has not been any significant flow of FDI as predicted by knowledge economy and the sector is increasingly experiencing brown-field or non-productive investments of mergers and acquisitions. Such consolidations increase the oligopolistic nature of the market and reduce competition and increases prices of medicines. In turn, medicine becomes unaffordable for the poor.

The chapter then looks at two key equity measures by which the access to health scenario can be judged under conditions of a thriving pharmaceutical sector. One is to see if medicines are becoming accessible to the poor. The chapter points out that medicine have become increasingly inaccessible and more people are being pushed into poverty as they try to access healthcare. Inequity has thus increased. Welfare has not trickled down to the poor despite patent protection. The other way access to health can be measured is by seeing if women's health has been improved by the existence of a thriving pharmaceutical sector. The chapter points out that women's health has not improved despite a thriving pharmaceutical sector. There is a long way to go before women's health issues are up to standard. This is critical to understand because the GOI claims that in promoting the biotech sector, its goals are primarily two-pronged. First, the GOI seeks to ensure employment generation. Second, the GOI seeks to satisfy the needs of rural women and people from weaker segments of the society (Bagchi-Sen and Smith 2009). The latter claim has certainly not materialized.

The chapter finally looks at neo-medieval governance to see if states and corporations are acting properly to carry out their responsibilities of providing access to health. The outcome that comes out of tracing state and corporate activities is that there

has been mixed efforts at trying to provide access to health. While there have been genuine efforts at providing access to health there has also been negligence on the part of both state and corporations. Negligence however, has outweighed efforts at trying to ameliorate the situation of the poor. Consequently, predictions of knowledge-economy that equity will trickle down with growth in the pharmaceutical sector have not materialized.

Growth of the Indian System of Medicine

The ancient knowledge system of Ayurveda is the most popular form of Indian System of Medicine. It has become the source of development of herbal drugs. Ayurveda represents a vast store of phenotype knowledge about rich people's diseases such as cancer and arthritis. It also is a source of drugs without side-effects. Biotechnology has been used in recent times to understand the genotype of plant extracts and its interaction with human genes.

Before looking at growth, it is critical to have some background knowledge about Ayurveda. Ayurvedic texts date back 5,000 years to Vedic era.²⁴ Ayurvedic medical texts Charaka Samhita (900 B.C.) and Sushruta Samhita (600 B.C.) from Northern India are notable. Ayurvedic texts cover internal medicine, pediatrics, psychiatry, ophthalmology, surgery, toxicology, geriatrics, eugenics and aphrodisiacs and cosmetics (Mukherjee and Awhile 2006).

²⁴ Texts are to be understood casually as oral knowledge that got conserved and written during the early part of the first millennium.

By thirteenth century, Ayurveda became blended with Rishasashtra or medicinal chemistry. Science of medicine was highly advanced in India, but, over time such knowledge became taboo, secretive and the domain of the Brahmin caste alone. Modern medicine or allopathy as understood in the West came to India with the British and became labeled as the only form of 'scientific' knowledge. Even then the European doctors marveled at Indian medicinal wonders such as rhinoplasty on which modern plastic surgery is founded (Kumar 2010).

Ayurveda is a depository of knowledge of Type I diseases, which are typically rich people's diseases. For example, the earliest reference to cancer in Sanskrit texts was made in Brighu-Samhita (300 B.C.). Brighu described Ashwagandha or *Withania somnifera* as a medicinal plant for treatment. Atharva Veda (2200 B.C.), and Sushruta Samhita (1500 B.C.) also refers to tumorous growth in lymph nodes; benign and malignant tumors in various forms, parts of the body and stages of growth; and the spreading nature of cancer or its metastases (Vaidya et al. 2010). A rare exception to this trend of knowledge development can be found in the report of the National Institute of Science, Communication and Information Resources of India. The report states that Ayurvedic records state that there are 30-40 plant extracts that are highly effective against dengue vector, a neglected tropical disease (Garg 2010).

Ayurveda deals with both preventive and curative aspects of life in a comprehensive way. The main stream of Ayurveda therapy has been Rasayana. Rasayana preparations deal with inducers of hormones and enzymes which the body needs for adaptation and survival during health stress and disease. Rasayana thus helps in

revitalizing and rejuvenating the body in a manner that arrests aging, increases life expectancy, strength and intelligence. Some examples of plants used in this therapy include *Withania somnifera* (chemopreventive, anti-cancerous and immunomodulatory); *Tinospora cordifolia* (cardioprotective); *Semecarpus anacardium* (anti-inflammatory, anti-arthritic, anti-oxidant, anti-hyperglycemic); *Acorus calamus* (anti-spasmodic and neuroprotective); and so on. These plant species are part of the top 20 Ayurvedic plants in demand in the world market. Out of the top 20 two plants *Aegle marmelos* (anti-diarrheal) and *Santalum album* (herpes simplex 1, 2) deal with poor people's diseases.

Now let's look at growth in Ayurvedic medicines. Growth of a pharmaceutical sector depends on research and development as well as exports volume and sales. Let's first look at research. Given that Ayurvedic medicines are concoctions of various plant extracts, increasingly the focus of biotech research has been on going beyond reductionist techniques of identifying single active phytochemical. Instead the focus has been on identifying holistic synergic effects of poly-herbal formulations. Following is an example of such an effort. *Withania somnifera* is a plant whose herbal extracts can selectively kill tumor cells and not normal cells. Decoris et al. (2008) applied a holistic system biological approach to understand the specific and synergic molecular pathways and bioactive effects of pure leaf crude extract of the plant. They studied the effects of individual components of the extract on specific genes. The genes had been derived as targets for anticancer activity through genome-wide functional screenings. Their study conclusively proved the usefulness of the plant for anti-cancer treatment.

Another prominent strategy of research that has emerged in the scientific community is reverse pharmacology. In this case researchers seek to reverse the process of 'labs to clinics' to 'clinics to labs.' Researchers document clinical experiences and experiential observations of drug use into leads that can be further researched in labs. This is an economical cost-effective measure for drug discovery. This is because it tackles a major problem of drug discovery - attrition of drugs with novel mechanisms due to toxicity in clinical trials (Patwardhan and Mashelkar 2009).

According to Patwardhan and Mashelkar (2009) bio-prospecting of Ayurvedic knowledge is offering better leads for the treatment of Type I diseases like AIDS and cancer. For example, Piramal Life Sciences Ltd., Mumbai, has a unique and diverse library of over 5600 natural product extracts from Indian medicinal plants. Their first molecular lead, NPB-001-05 is currently undergoing human clinical trials for chronic myeloid leukemia. The second lead, NPS31807, is being developed for the treatment of chronic inflammatory disorders including rheumatoid arthritis. The third lead has been developed as a topical formulation with good antidermatophyte activity against a panel of microorganisms.

Ayurveda is a huge source of medicinal plants that have antiviral and anti-tumor activities. This should be considered in light of the fact that many antiviral compounds presently in clinical use have a relatively narrow spectrum of activity, limited therapeutic usefulness, variable toxicity, and are developing drug-resistance. Viral infections, moreover, are now recognized as the second most important known cause of human cancer. Increasingly, Ayurvedic knowledge is being used to derive antiviral

phytochemicals as bioactive agents from plants through assay-based genomic tests. Several discoveries have been made so far. These include flavonoids, alkaloids, terpenoids, carotenoids, organosulfur compounds, vitamins, selenium compounds and miscellaneous. For example, flavonoids such as *Bolusanthus speciosus* has shown excellent anti-HIV activity; *Trollius chinensis* has shown activity against influenza virus; *Tephrosia madrensis* has shown effectiveness against Dengue virus; and alkaloids such as *Catharanthus roseus* has been shown in in-vitro studies to have potent activity against vaccinia and polio Type III viruses (Naithani et al. 2010). A whole range of well-known cancer chemotherapeutic drugs are derived from secondary metabolites of plants such as paclitaxel (recently discovered to be effective through alkylating agents against myeloid cancer), camptothecin and podophyllotoxins (Pandey et al. 2011).

According to Pandey et al. (2011), the new found popularity of Ayurvedic phytomedicine is due to their almost miraculous success with cases which were given up as hopeless by mainstream allopathic doctors. This should be considered in light of the fact that Ayurvedic knowledge is providing curative leads for hard to cure diseases such as various forms of cancer, and neurodegenerative diseases such as Huntington, Alzheimer, and Parkinson (Bhatnagar, 2009). A proof of the rise of popularity of herbal medicine lies in the fact that between 1983-94 the US approved 157 (out of 520) drugs (mostly anticancer) that was based on natural products or their derivatives (Bhatnagar, 2009). According to Pandey et al. (2011), currently about 25% of pharmaceutical prescriptions in the US contain at least one plant-derived ingredient.

In India, most of the research on medicinal plants is mainly funded by the central government departments such as the Department of Biotechnology (DBT) and the Council for Scientific and Industrial Research (CSIR). The contribution of private partnerships to such research is almost insignificant. But, this is changing due to lack of viability of newly researched drugs. The Central Drug Research Institute functioning under CSIR developed ten new drugs and licensed them to various Indian companies. But, most of these could not survive due to market competition in similar products by MNCs. Hence, major national labs, well-known academic institutions and 50 pharmaceutical companies have become involved in public-private projects. A promising development from such collaboration has been the development of a herbal formulation for treatment of psoriasis. The botanical drug product Desoris is an extract of single plant that has led to an improvement in psoriatic lesions. Currently, this product is under Phase 3 clinical trials. It has been developed to conform to USFDA and Drug Control General of India guidelines for botanical development. This discovery came about through collaboration between the company Lupin and CSIR's New Millennium Indian Technology Leadership (NMITLI) which started in 2001 (Bagchi-Sen and Smith 2009).

Currently, a project to develop herbal vaccine adjuvants using a reverse pharmacology approach is being undertaken by the Department of Science and Technology, Interdisciplinary School of Health Sciences, University of Pune, Maharashtra, and an industrial partner, the Serum Institute of India. A detailed safety profile of one of the leads has been found to be over 20 times more potent than its effective preclinical immunomodulatory dose. Similarly, a NMITLI scheme involving a

network of 16 national research institutions, modern medicine hospitals and Indian pharmaceutical industries has also led to the development of herbal drug for osteoarthritis and a patent application for it. This was accomplished in 5 years with an expenditure of US \$2 million. Currently, CSIR is seeking to identify an industrial partner for further development, manufacturing, registration and marketing of the drug (Patwardhan and Meshalkar 2009).

In research there has been a general thrust towards regulating and standardizing botanical medicine in order to enhance exports through quality control. The major herbal manufacturers like Himalaya, Zandu, Maharshi, Hamdard, and Dabur and allopathic manufacturers like Ranbaxy, Allembic and Lupin are standardizing their formulations by thin-layer chromatography and high performance liquid chromatography fingerprinting. Such activities enable identification of active molecules in a plant and enable quality control (Ramawat and Goyal 2008).

All above mentioned research efforts has been helpful in IPR claims. According to Sahoo et al. (2011), in the last decade 557 published Indian applications and 210 world patents applications have been filed by Indians. The former was filed mostly by individuals and the latter mostly by companies. From the US patent applications filed during 2001-10, CSIR was granted 57 patents. Among companies Sahajanand Biotech had 6 patents, Sami Labs and Indus Biotech had 5 patents respectively, and Laila Impex, Piramal Life Sciences and Lupin Ltd. have 2 patents respectively. All patents were for rich people's diseases. For example, 12 patents were for immunomodulator and diabetes respectively; 9 for cancer; 8 for metabolic disorder and anti-inflammatory respectively; 6

for hepatoprotective, skin-disease and anti-microbial respectively; and 3 for respiratory and neurological diseases respectively.

In European Union, 31 applications from India have been granted patents. CSIR has 20 grants that include patents for hepatic disorders, cancer and anti-microbial segment. Three major companies, Indian Herb Research and Supply, Indus Biotech and Sahajanand Biotech have been granted 1 patent respectively. Unlike, the US, in the EU, more individuals filed for and received patent grants under the International Patent Classification Code related to traditional knowledge in the classes A61K36 and A61K31.

Let's now look at growth in volume and sales in this pharmaceutical sector. Indian herbal product market has grown to US\$ 1 billion. The export-market for crude herbal extracts is about US\$ 880 million, of which 50% is contributed by classical Ayurvedic preparations (Pandey et al. 2010). The most successful solely Indian company is Himalaya. The company's products are being sold in 86 countries and it is growing at a compound annual rate of 20% per year (Rai, 2008).

Within India, the Department of Indian Systems of Medicine comprising of Ayurveda, Yoga, Unani, Siddha and Homeopathy (AYUSH) has expanded by setting up AYUSH hospitals and dispensaries. According to Premachandra (2011), currently, medical facilities under AYUSH include 3,277 hospitals and 24,289 dispensaries. In 2010, there were 8644 AYUSH drug manufacturing units or licensed pharmacies. The domestic market for AYUSH medicine was estimated in 2009 to be growing at 20% annually. AYUSH has also spurred medical tourism and eco-tourism in India. The

medical tourism industry is expected to be worth US\$ 4 billion by 2017 (Premachandra 2011).

Growth in Pharmaceutical and Biotechnology Sectors

There are significant constraints to growth of the biotech sector in India. To tackle the constraints Indian corporations have come up with some strategies of growth. Hence, first this section looks at handicaps and growth strategies. Finally, the section looks at concrete growth figures.

Biotech industries in India are hamstrung by several major problems. First problem faced by the biotech companies is lack of private equity and venture capital for biotech novel drug development sector because it requires substantial risk-capital outlays for long periods of time with high uncertainty of return. In 2006, private equity and venture capital investment in India was about US\$ 7.5 billion, and less than 7% of it went to healthcare and life science industry. Hence, biotech industries comprised of medicines, vaccines, diagnostic and gene therapy are still hamstrung by the difficulties they face in commercializing technology (Arora 2010).

According to the Department of Industrial Policy and Promotion, the pharmaceutical sector attracted foreign direct investment (FDI) worth \$1.67 billion between April 2000 and March 2010, with an annual average of 0.167 billion. In comparison, FDI inflow for all sectors during the 10 year period was \$197.935 billion at an annual average of \$19.79 billion. Pharmaceutical's share was thus only 0.84% of the total inflows of FDI. FDI equity into India during the 10 year period for all sectors was \$132.837 billion at an annual average of \$13.28 billion. Mauritius, Singapore, US, UK,

Netherlands, Japan, Cyprus, Germany, France and the UAE contributed to the FDI equity inflow during 2009-2011. There was no contribution to the drug and pharmaceutical sector. However, there was a 2% inflow into chemicals, other than fertilizers (pharma.financialexpress.com).

Overall, contra knowledge economy prediction, imposing a product patent system has not garnered a significant flow of FDI to India. For example, China garnered FDI of \$83.5 billion in 2007, \$108.3 billion in 2008, \$95 billion in 2009, and an estimated \$101 billion in 2010. In comparison India's figures were \$25 billion, \$40.4 billion, \$34.6 billion, and an estimated \$23.7 billion. FDI inflows plunged 34% to \$22.7 billion in 2012 from \$34.6 billion in 2011 due to global uncertainties such as the Eurozone crisis and global economic slowdown. For the period of 2012-13, FDI inflows were down 42% at \$17 billion from 29.3 billion for the April-December period a year before. According to the UN Conference on Trade and Development, this slump occurred at a time when global FDI inflows to developing countries surged and surpassed the level of investments in developed countries by \$130 billion. In fact, in November and December of 2012 there was a continuous slump in FDI. FDI inflows during this short period declined by 19%. In November, India attracted FDI worth \$1.05 billion which was a 2 year low.

Second problem faced by the biotech sector is that most of the companies are small and medium sized, and they cannot access the benefits provided by the GOI through its SEZ programs due to issues of scale and investment threshold. Most of such companies set up by returning immigrant scientists from the US face bureaucratic barriers in accessing financial assistance from the GOI. These companies have less infrastructural

support and formal methods of marketing and hence, they rely heavily on personal networks and word of mouth. They face stiff competition from large biotech companies, both domestic and foreign. They have tried to circumvent such problems by tying up with home-grown universities, a la growth style of the US pharmaceutical companies (Arora 2010).

Third problem faced by biotech companies arises from their desire to leverage biosimilars, generics of biologics.²⁵ This is a difficult process, and hard to reproduce. Unlike synthetic generics where one size fits all mode can be adopted, biosimilars are more targeted and any change in the manufacturing process could have unpredictable effects on human body (Kamath 2011). Hence, only highly skilled biotech companies can thrive in this market. This means that only these companies are likely to draw more collaborative capital. Moreover, while basic research is available internationally through scientific publications, the translations of such biotech research into low-cost production processes is guarded by developed country firms as it forms the basis of their comparative advantage (Bagchi-Sen and Smith 2009). This hampers the development of the biotech sector as a whole.

Pharmaceutical sector typically has been focused on the development of small molecules of chemical entities for drugs. Biotech sector on the other hand is concerned with discovery of large molecules/biologics based on live cells from humans, animals and

²⁵ Most of the research is currently focused on biosimilars as the market for it is pegged at well over \$100 billion. In US alone 8 major biologic products like Enbrel (Amgen/J&J) and Lovenox (Sanofi-Aventis) are expected to go off-patent between the period 2009 and 2013. Total revenue from these drugs will be over \$15 billion. In the next decade, 48 biologics with an estimated \$73 billion are going to become off-patent. Thus, biosimilars will become new streams of revenue for biotech companies (pharma.financialexpress.com).

microorganisms for sugars, proteins, nucleic acids or complex combinations that can be used for therapeutic purposes. Given the highly enhanced degree of complexity in biotech drug and vaccine discovery for three primary diseases - cancer, rheumatoid arthritis and diabetes - emerging market biotech companies often face accusations in the developed world of producing poor quality biosimilars. The Indian regulatory environment is described by some as being of poor or low quality and hence, generic versions of biologics are called biogenerics rather than biosimilars (www.slideshare.net). The US in 2012 banned the entry of biosimilars (Rajagopal 2012). Since the US is the largest drug market, this has left Indian companies with only marginal profits in the European market and other emerging markets. On top of that stiff competition has meant only large successful Indian companies with significant capital outlay have the possibility of penetrating such markets.²⁶

Fourth, problem that biotech companies face is the lack of significant innovation. According to Arora (2010), majority of Indian small and medium biotech firms do not have the capability to be prospectors or innovators and first-movers with a focus on R&D, and hence are not able to create value. Rather they tend to be analyzers, that is, those that tend to emphasize low cost production and efficiency in a secure niche market during stable times. During turbulent times, they adopt a wait and monitor competitors' approach in order to see which innovations of the competitors appear to have strong market potential so that they can adopt them. This has meant that in comparison to global

²⁶ For example, in early 2008, Biocon, the largest Indian biotech company (en.wikipedia.org), and ranked 16th out of top 20 global companies (Arora, 2010), acquired 70% stake in the German pharma company Axicorp. Axicorp specializes in marketing and distribution of generics and would help in marketing of Biocon's injectable insulin (www.slideshare.net).

MNCs, Indian companies' investment in R&D is very low. For example, while 13 major Indian companies together spent US\$ 454 million in 2007-08, Pfizer, the largest MNC alone spent US\$ 8.1 billion in 2007²⁷ (Chaudhuri 2010).

Companies that stand tall in innovation in the Indian market, such as, Strides Astrolabs that has created breakthrough biotech products related to hormones and anti-carcinogenic drugs (Khan, 2008) are those that have significant capital outlay. Companies engaging in clinical research including Nicholas Piramal, Reliance Life Sciences, Lambda Labs (a division of INTAS pharmaceuticals) and Lotus Labs (an offshoot of EROS Pharma) are all major Indian companies (Bagchi-Sen and Smith 2009). But, not all major companies are always successful. For example, Panacea Biotech claims that it is in the process of graduating from pediatric to adolescent and adult vaccines for diseases such as rotavirus, HIV, dengue, Japanese Encephalitis, pneumococcal and Hepatitis. However, recently the WHO disqualified its 'pre-qualified' three-combination vaccines that it supplied to the organization because a site-audit team spotted deficiencies in the company's Punjab-based plant's quality management system. The consequent financial impact on the company is likely to prevent progress in innovations (Amirapu 2011).

Indian companies have overcome the above mentioned handicaps by collaborating with biotech MNCs for innovative drug discovery (Srivastava et al. 2010). Often collaboration takes the form of outsourcing in terms of R&D from the US. In the US, usage of generic medications have been increasing and Indian companies have

²⁷ Only 10% of the R&D funds are aimed at diseases primarily affecting developing country like India.

started to aggressively tap into the generic medicine market by taking advantage of a number of blockbuster drugs going off-patent, such as GSK's cholesterol drug Lipitor (Beasley 2011). This has increased credibility of the Indian companies.

The newly emerging collaborative ventures have led to the creation of Contract Research Organizations (CROs) for drug manufacturing, discovery and clinical research (Arora 2010). For example, biotech firm Avestagen Laboratories performs R&D for many European pharmaceutical companies. Syngene, promoted by Biocon, has tied up with Bristol Myers Squibb (BMS) to operate an R&D center of about 400 scientists. Syngene has also tied up with Astra-Zeneca for drug discovery. Orchid Chemicals has partnered with Bextel for drug discovery in metabolic diseases. Biocon, has tied up with BMS, Pfizer, Astra-Zeneca for contract research bulk drugs. Divi Laboratories is involved with Merck, Abbott, and GSK for manufacturing of patented drugs, custom synthesis and scale-ups. Sashun Chemicals is in R&D service agreement with Aventis, Eli Lilly, GSK, and Teva for contract research and custom synthesis services. Astra Zeneca has tied up with Torrent for collaborative R&D for discovering a drug for treatment of hypertension. Bexel Lab has tied up with Orchid Pharmaceutical for development of anti-diabetic molecule. Lupin has entered into development and licensing agreement with Cornerstone Bio Pharma Inc. for development of an anti-infective product. Jubilant Organosys has entered into contract for RZ7D service with Eli Lilly for diabetes and oncology. Given such extensive tie-ups, the market for CRO is expected to grow at 20-25% a year (Rai 2008).

Indian companies have also entered into collaborative in-licensing that enables local manufacture of extant drugs owned by MNCs and share profit with them. For example, Glenmark has in-licensed Crofelmor, Napo's proprietary anti-diarrheal compound. Wockhardt has in-licensed Syrio Pharma SpA's dermatology products. Nicholas Piramal has entered into an agreement with Roche for launching products dealing with cancer, epilepsy, and AIDS (Rai 2008). Bharat Biotech and Serum Institute has licensed technology from institutions in the US, Canada, and Netherlands (pharma.financialexpress.com).

Collaboration between India and other countries has also taken the form of writing research papers. India's research output, its growth rate, publication share and global ranking has been steadily growing. In 1998, India's global publication rank was 14 and by 2007 it was 9 with publication rising sharply from 1.77% in 1998 to 2.37% in 2007. 15 foreign journals including top journals Nature and Science together contributed to 22.52% of India's total publication output during this time period. In all this research, USA was the largest collaborative partner accounting for 43.55% publication share (Bala and Gupta 2010).

The general view in the Indian pharmaceutical industry is that to overcome handicaps more investment from the GOI is needed to ramp up fundamental research capabilities to develop novel products and New Drug Delivery System. Domestic biotech companies are already benefitting through schemes such as Small Business Innovation Research Initiative, Biotech Industry Partnership Program, Biotechnology Industry Research Assistance Program of the DBT, Industrial Infrastructure Upgradation Scheme,

Industrial Park Scheme and the Scheme for Investment Promotion of the Ministry of Commerce and Industry, National Agricultural Research system of the Indian Council of Agricultural Research, Talent Research Scheme and Extra Mural Project scheme of the ICMR, NMITLI, etc. (pharma.financialexpress.com). Despite such growth strategies, 3/4th of the patents in India are currently assigned to foreign MNCs (Arora 2010).

Fifth, Indian drug companies are handicapped by regulatory demands. For example, in the USA, in order to launch drugs, Indian companies have to conduct a substantial portion of their clinical trials there. This is highly cost prohibitive. Under such circumstances, Indian companies tend to develop new molecules up to a certain stage and license them out to MNC partners and use their help for commercialization. This is contra TRIPS prediction that there would be an inward transfer of technology to developing countries. Moreover, such activities mean that molecules that are licensed out are those that the global MNCs are keen to develop into drugs that cater to their main markets in the developed countries. For example, in 2004, Biocon entered into strategic partnership with the US pharma company Nobex Corporation for the co-development and commercialization of oral insulin for diabetes treatment at a global scale (Khan 2008). But, sometimes the licensed molecules may not be further developed by the MNC if it competes with existing or planned products of their own. Licensing then may result in the perverse situation of non-drug development and hence, curtailing of knowledge growth, contra knowledge economy prediction.

To overcome the handicap of regulatory demands and ensure development of lead molecules, some Indian drug companies like Dr. Reddy's has started to explore

alternative business models, such as joint development and sharing of costs with smaller specialized research companies, such as Rheoscience and Clin Tec. Both MNC and Indian companies are increasingly tying up with specialized clinical research companies such as Vimta Labs, Synchron and Reliance Clinical Research.

Indian companies have also been able to overcome handicap of regulatory demands due to an emerging trend among the MNCs. There has been a growing reverse trend to licensing out lead molecules due to increasing costs of clinical trials in developed countries. The need to cut costs is increasingly pushing MNCs to conduct clinical trials in India. Latest studies show that Phase I trials cost half that of those conducted in the US, and Phase II and III cost less than 60%. Clinical trials are expected to represent 65% of the growing Contract Research Organization (CRO) market in India. Pfizer itself has invested US\$ 13 million in India for Type I clinical trials (Garg et al. 2011). Upto June 30, 2010, there has been 1,078 trials registered, 666 of which are drug trials and 157 are biological. In 2010, 21 trials were public and 191 were private. In 2010, there were 47 institution/agency sponsors and 186 pharma sponsors. Trials included trials for bacterial and intestinal infections, STD category, diseases of the digestive system and so on.

Beyond the above mentioned strategies of growth, joint ventures have been another modality of growth for the Indian companies. For example, Biocon in 2009 has entered into partnership with Mylan to produce several biosimilars, such as, Herceptin a breast cancer drug. This drug produced by Roche is soon to go off-patent (Rajagopal 2012). But, Mylan has exclusive marketing rights in the USA and Europe with a special profit-sharing agreement with Biocon. Biocon intends to launch such biosimilars into the

established market of India (www.slideshare.net). Similarly, GSK has recently entered into a 50/50 joint venture with Biological E., a leading Indian vaccine company. The purpose has been for the early stage R&D of a six-in-one combination pediatric vaccine that would help protect children in India and other developing countries from polio and other infectious diseases. The vaccine would combine GSK's polio with B.E.'s pentavalent vaccine for diphtheria, tetanus, whooping cough (whole cells pertussis), hepatitis B and Haemophilus influenza. The vaccine would involve fewer injections for children and thereby improve compliance in immunization schedule (www.gsk.com).

Boehringer Ingelheim has partnered with Kemwell for manufacturing drugs at low cost (pharma.financialexpress.com). Claris Life Sciences Ltd. has sold majority (80%) stake in its infusion business in India and other emerging markets by forming a three party joint venture with Japan's Otsuka Pharmaceuticals Factory Inc. and Mitsui Company Ltd. Claris will move its anti-infectives, common solutions, plasma volume expanders, and parental nutrition therapies businesses to the joint venture. The emerging company Claris-Otsuka will bring Otsuka's specialty products to India (in.reuters.com). Overall, North-South collaboration of biotech firms range between 60-75% in India (Melon et al. 2009).

Joint-ventures and collaboration is not the only way of growth in the biotech sector. Some companies like Dr. Reddy has made solo strides in the field of biosimilars. In 2007, it launched the rituximab, a biosimilar of Roche's US \$6 billion cancer drug Rituxan. The company is selling the drug in emerging markets at a 30-50% discount to the innovator brand. Similarly, its darbepoetin, a drug for severe anemia, was the first

biosimilar of Amgen's US\$ 2 billion Aransep (Kamath 2011). To be strongly innovative, in 2000, it has set up a lab for discovery and design of novel therapeutics in Atlanta, USA. The purpose has been to tap into the diaspora of scientists who can not only provide a knowledge-base but, also provide entry into the US technology networks (Kale et al. 2008).

The Indian biotech sector has also been characterized by brownfield investments of mergers and acquisitions (Banerji 2009). Such investments narrows the biotech field into a more oligopolistic market and reduces competition and hence, growth. For example, Ranbaxy was taken over by Daiichi Sankyo of Japan in 2008. It was the fifth largest generic company in the US with USFDA approved 81 generic products. With acquisition, the availability of such drugs for the domestic market became uncertain. Shantha Biotechnics was taken over in 2008 by Sanofi Aventis of France (Kamike and Sato 2011). The availability for the domestic market of the company's extremely cheap Hepatitis B vaccine whose cost was US\$0.50 as compared to SmithKline Beecham's US\$10 became uncertain. Indian company Matrix, one of the world's leading producers of Active Pharmaceutical Ingredient was taken over by Mylan of the US in 2006 (Rai, 2008). Such a takeover made access to generic drugs problematic. Dabur India Ltd. was taken over by German company Fresenius Kabi in 2008 with a 73% stake. Orchid Chemicals was taken over by Hospira and Piramal Healthcare was taken over by Abbot Laboratories (Reddy, 2013).^{28 29 30}

²⁸ Biotech company takeovers have been made possible because investment and ownership restrictions on MNCs were relaxed under the National Pharmaceutical Policy of 2002. Such takeovers has reduced

Despite several major handicaps and mergers and acquisitions, the Indian pharmaceutical sector has been growing steadily. According to Rai (2008), the Indian pharmaceutical industry ranks 4 in terms of volume and 13 in terms of value. It accounts for 8% of global production and 2% of world markets in pharmaceuticals. Currently, in value terms, Indian pharmaceuticals companies produce between 20-22% of the world's generic drugs, 60,000 finished medicines and nearly 400 bulk drugs used in formulations or Active Pharmaceutical Ingredients. Because labor costs in India are 1/7th that of the US and Western Europe, manufacturing costs are 30-40% lower than these countries and hence, the industry is the provider of cheapest drugs in the world (Rai, 2008). India tops the world in exporting generic medicines worth \$11 billion and currently, the Indian pharmaceutical industry is one of the world's most developed industries (Reddy, 2013).

competition in the market and made drugs costlier. It has also made the probability of drug discovery for Type II (those covered by Millennium Development Goals 6) and Type III or neglected tropical diseases ever more a distant dream.

²⁹ Mergers and acquisitions increase the oligopolistic nature of the pharmaceutical market, reduce competition and increase prices of essential drugs. After the acquisition of Ranbaxy, the Ministry of Commerce became concerned with the very liberal domestic entry regime. Such a regime prevents India's dream of becoming a global power through its champion corporations.

³⁰ Drug and vaccine development for Type II and III diseases have been very rare because of the low purchasing power of the domestic population and the virtual absence of any health insurance (Chaudhuri, 2010). According to Boyer (2010), in 2005, as part of global share of pharmaceutical sales, Indian subcontinent's consumption was only 1.2%, even though poverty contributed to 50% of the health-related conditions. According to Amirapu (2011), stiff competition from established companies, improper infrastructure and lack of government initiatives act as disincentives for private vaccine-makers in India to invest in diseases of the poor. The only disease that really gets any major traction is HIV/AIDS because India is the global supplier of generic anti-retroviral (ARV) drugs. Second and third line ARVs however, has become difficult to produce ever since India abandoned reverse engineering of drugs and signed onto TRIPS.

The Indian biotech market³¹ is dominated by biopharmaceuticals and in the past year it grew by 30%. In 2010-11, the biotech sector netted revenue worth US\$ 2300 million (Rajagopal, 2012). The biopharma growth rate is expected to be at a compound annual growth rate of 15-20% to reach a value of anywhere between US\$ 50-74 billion by 2020. Between 2008 and 2015 industry estimates indicate that US\$ 59 billion worth of biologics will go off-patent. This is expected to spur growth in an established biosimilar market like India (Kamath 2011). On top of that, early last year, the GOI passed an initiative to allow for 100% FDI without the threat of compulsory licensing made available in the TRIPS treaty for provision of medicine for the poor (en.wikipedia.org). This deliberate sidelining of equity is expected to add to growth.

Next, I explore two equity measures – health costs of the poor and women’s health in India in order to depict that a thriving medical sector has failed to deliver equity to poor women.

Health Costs of the Poor

Access to medicines is a universal human right and states are primarily responsible for provision of that right. Currently, under the dictates of neo-liberal structural adjustment programs that demand privatization and liberalization of the health

³¹ Due to India’s history of process patents, prior to adopting the TRIPS, many MNCs had left India in the 70s. This means that currently in India, 40% of the market is accounted for by MNCs who control 30% of market share (Ramawat and Goyal, 2008). According to Arora (2010), there are a total of 706 biotech (including herbal extracts and nutraceuticals) companies in India. The biotech industry is clustered and regionalized mostly in the western and southern states with these states proactively promoting bioscience complexes through parks and institutions to leverage spillover effects beyond start-ups (Khan, 2008). In the city of Mumbai, Maharashtra alone there are 105 companies, and Maharashtra as a whole has 175 companies. In comparison, West Bengal has barely two biotech companies, one of which is the leading herbal company Dabur.

sector, there has been increasing withdrawal of the government from the public sector welfare activities. This was supposed to have curtailed corruption and bring more efficiency in health delivery. However, health access under such steps has increasingly declined. As public expenditure has dropped, expenditure of the poor has increased, particularly expenditure for medicines. Despite a thriving pharmaceutical sector, the nation's poor has not benefitted to any significant extent. Expenditure on healthcare has increased the burden of poverty of the poor. This burden of poverty is what we explore first.³² Second, there is exploration of the outcomes of privatization and liberalization. Contra predictions of knowledge economy, privatization and liberalization have not brought about better healthcare conditions. Corruption and inefficiency thrives in the private sector as much as it does in the public sector.

The poor Indian public is burdened by private health care costs which they either cannot afford or can ill-afford. In 2004, public health expenditure as part of GDP was 0.9%, per capita health expenditure was US\$31, and out of pocket expenditure (OOPE) as a percentage of private health expenditure was 93.8% (Jain, 2010). According to Baru et al. (2010), from 2004-06, government spending was about 19-20% of health expenditure while per capita health expenditure was around US\$ 35. As per National

³² According to the WHO estimates, currently in India, 39% of people live without access to essential medicines (Satyanarayana and Srivastava 2007). According to Satyanarayana and Srivastava (2007), the R&D support for development of vaccines and drugs for neglected and NTDs is still sub-critical. Out of 1,223 new drugs approved between the periods of 1975 and 1997 approximately 1% or 13 drugs were those that specifically treated tropical diseases. New essential drugs are coming into the market but, they are under patent protection and are likely to remain out of reach of the poor people because of high prices. The market for essential drugs in India is miniscule. In 2005, the global pharmaceutical market in terms of ex-manufacturer prices was only US \$7.2 billion. In terms of global share of sales this figure represented a mere 1.2%. While the biotech sector thrives, majority of the common people do not get the benefit of such success as they are poor and they are not helped by the poorly-governed government-sponsored public sector healthcare.

Health Accounts of India, the government expenditure on health as a percentage of total expenditure is 17.9% while private expenditure is 82.1%. Drugs account for nearly 70% of private health expenditure (Srivastava et al., 2010).

According to Shiva Kumar et al. (2011), despite the steep increase in economic growth, per person income and tax collections, there has not been a corresponding increase in health welfare. For example, between the period of 1993-94 and 2004-05 compared to a 67% increase in real per person income and an 82% in per person tax collections, real per person public health expenditure at 1993-94 prices increased from Rs. 84 to Rs. 125 (\$2-3), an increase of 48%.³³ According to 2005 National Family Health Survey, government expenditure accounted for 22% of total health spending. This represented a decline from 22.6% spending in 2001-02. Hence, private spending which in 2001-02 was 77.4% went up to 78% in 2004-05.

According to Rao et al. (2011), 80% of outpatient visits and 60% of hospital admissions are in the private sector. As a result, 71% of health spending is OOPE. Every year this forces 4% of the population into poverty. These facts reveal the worsening conditions of the rural poor who spend a greater proportion of their income in health care than people living in urban areas. The rural-urban gap in health expenditure in 1999-2000 was 1.03%, but by 2004-05 it was 1.42% (Jain 2010).

OOPE has been rising steadily in India. In 2005, 74% of the OOPE was due to outpatient treatment, 26% was for inpatient treatment, and 72% was for drugs. In 2004,

³³ However, at purchasing power parity of international \$100 per person, India's per person health expenditure is dismally low. It is 22% that of Sri Lanka and 16% that in China.

47% of hospital admissions in rural India were financed by loans and sale of assets. In 1993-94 health spending in rural households of India was 5.4% of the total household consumption. By 2004-05, the spending had risen to 6.6%. Between 1993-94 and 2006-07 cost of medical care tripled due to sharp rise in prices of drugs. In 1995-96, 15% of ailments in rural areas went untreated because of financial reasons, but, by 2004, 28% of ailments were untreated. Demand deflation for health care was thus driven by poverty rather than necessary lack of provision. Given the increasing feminization of agriculture these figures represent an increasingly precarious situation for women (Shiva Kumar et al. 2011).

Healthcare in India is financed substantially through OOPE payments by individuals and households. 80% of total health expenditure and 97% of private expenditure are borne out by OOPE payments (Baru et al. 2010). According to Berman et al. (2010), in 2004, around 11.8 million households or 63.22 million individuals were pushed below poverty line (BPL) due to OOPE. 79.3% of this impoverishment was due to outpatient care which involves relatively small but, frequent payments and the rest was from inpatient care. Much of this impoverishment, 76.5% households or 77.4% individuals occurred in rural areas. In West Bengal approximately 7% of households fell below poverty line (BPL), while in Maharashtra, 7.5% fell BPL. In a state-wise ranking of the percentage of households falling BPL due to inpatient and outpatient costs, Maharashtra ranked second, worse than West Bengal's rank of third. With the focus on just inpatient care costs, Maharashtra by accounting for 12.5% of impoverishment,

ranked first in the percentage of households falling BPL. In comparison, West Bengal fared better. Accounting for 8.2% of total impoverishment, it ranked fifth.

According to Baru et al. (2010), in rural areas, the poorest quintile spends 87% of OOPE on medicines. Due to this fact, in 2005-06, an additional 3.5% of the population or 35 million people fell BPL. Rural households have to borrow 40% of their hospitalization expenditure. To compensate, households have to often cut down on consumption levels of other members of the household. Since women are seen as caretakers of households, it is their health concerns that get axed first.

The above mentioned issues of health expenditure and poverty are exacerbated by the fact that there is severe weakness in the delivery of public health services. The sector is plagued by lack of accountability, absenteeism among medical and paramedical personnel providing health service in poor areas, indifferent and even rude behavior of service providers and corruption (Baru et al. 2010), lack of essential medicines and inadequate capacities, such as, obsolescent and unusable equipment (Welshoff 2006). According to Sabharwal (2010), the public sector is also plagued by discrimination towards low caste women. Dalit or scheduled caste women are denied medical services or are subjected to rude behavior. Hence, these women have to take debt in order to gain expensive private medical attention. Debt-burden increases the level of poverty and inability to take care of health concerns.

Besides public services being riddled with problems, the public sector simply acts as a referral portal for the legalized private services. The private services are also plagued by corruption as evident in doctors getting commission from pharmaceutical companies

for pushing certain drugs, for getting commissions for referring patients for diagnostic services, and non-compliance to equity conditionalities by corporate hospitals even while receiving public subsidies (Baru et. al. 2010).

Despite corruption all-around, and poorly regulated nature of the private sector, people lean heavily on private services. 80% of the population is dependent on the private sector for outpatient care. In 2004, a mere 21% of the rural people utilized the public sector for outpatient services. The rural usage for inpatient care of public services has fallen from 60% in the 1980s (prior to liberalization) to 42% in 2004. At the same time, due to the unregulated nature of private health care, patients are subjected to huge variations in costs for the same types of interventions. For example, for a normal delivery the cost in public sector is anywhere from Rs. 0-128. In the private sector, this cost varies from Rs. 472-1573. Unregulated care also means that there is significant poor quality of healthcare and irrational practices in prescription of medicines for treatment of communicable diseases like malaria, diarrhea and TB. This increases the possibilities of developing resistance to strains of these diseases. These facts not only lead to impoverishment but also to malnutrition (Baru et al. 2010).

According to Kumar and Prakash (2011), the growth of private sector has been driven by several key factors. These include a new national economic policy, the rapid influx of medical technology, growing public sector hospital deficits and a rising middle class. Women tend to switch over to private health services once they get their first treatment in public care. NSS 2004 data reveals that almost 97% of rural and 96% of urban inpatients of hospitals received health treatment from the private sources during the

period of one year before the survey. During the periods 1999-01 and 2002-04, out of the sampled population, 94% of women who had live births, 1% experienced stillbirths, 2% had spontaneous abortions and almost 3% of women reported induced abortions. About 66% of induced abortions were performed by private services. But, within 6 weeks of abortion, 67% of the women experienced health problems. In comparison, among the women who had used public services for this purpose, only 26% experienced health problems. Interestingly, despite the negative performance of healthcare provided by private health care centers, only 7% of women who had earlier had their abortions at private health centers went onto use public healthcare for their second treatment. 49% of women continued to receive antenatal checkups from private sources compared to 45% from public sources.

According to Kumar and Prakash (2011), public health services are utilized heavily for pre-natal treatment. NSS 2004 data reveals that 55% of women received free of cost iron folic acid tablets during pregnancy from public sources compared to 18% who chose to buy them from private sources. Overall, the usage of subsidized public healthcare shows that on average 67% of women in India utilized it for family planning services, 11% for delivery purposes and antenatal care services, 6% for the consultation and treatment of reproductive tract infections and other related problems, and 3% for child healthcare services. In the case of child healthcare where there was free service such as immunization, there was a clear preference for public services. Similarly, there was a clear preference for private health care for treating diseases like diarrhea and pneumonia. Overall, women irrespective of class overlooked inconvenient location of

services and preferred private services for induced abortions, despite the unregulated nature of the sector.

In utilizing private services, many women have been pushed into poverty. Here, it is interesting to note that in utilization of rural services West Bengal ranked at 1 and Maharashtra did slightly worse with a rank of 2. However, in utilization of private services Maharashtra's rank was 6 and Bengal ranked at 12 with much lower utilization (Kumar and Prakash 2011). Overall then, having a thriving private pharmaceutical sector has not benefited the Indian poor to any significant extent.

Women's Health in India

A key measure of whether a thriving pharmaceutical sector has led to welfare is to look at gender welfare. Under the norms of the Universal Declaration of Human Rights, the GOI has the primary responsibility of ensuring access to health. According to Khosla and Hunt (2012),

medical care in the event of sickness, as well as the prevention, treatment, and control of diseases are central features of the right to the highest attainable standard of health. These features depend upon access to medicines' (Khosla and Hunt 2012: 27).

Without such right to health, poor women's lives are defined by gross inequity, ill health, pain, fear, loss of dignity and life. It is in light of the GOI's responsibility in providing right to health and life that it is critical to note that despite a thriving biotech sector and many public initiatives undertaken by the GOI, the GOI has yet to deliver good health for the women in India.

Let's first look at what the GOI has done. The GOI implemented the National Policy for the Empowerment of women in 2001. Since 2006, the Ministry of Women and Child Development (MWCD) became a nodal ministry for advancing human rights and concerns for women and children. According to MWCD, rural women constitute 70% of the female population in the country and the majority of them are poor. Among them the disadvantages faced by SCs, STs, minority groups and the poor are greater than mainstream population. Most of the MWCD's programs are directed towards this section of the disadvantaged population. One of the critical aims of MWCD is to raise the sex ratio for age group 0-6 from 927 in 2001 to 935 by 2011-12 and to 950 by 2016-17. Another aim is to reduce Infant Mortality Rate from 57 to 28 and Maternal Mortality Rate from 3.01 to 1 per 1000 live births. MWCD would also seek to reduce children's (0-3 years of age) malnutrition by half of the present level and reduce anemia among women and girls to 50% by the end of 2011-12. The MWCD acts with several relevant ministries including the Ministry of Health and Family Welfare to further the alleviation of such issues. Overall, with the help of the MWCD, the GOI is trying to ensure that at least 33% of all direct and indirect beneficiaries of all government schemes are women and children.

One of the critical schemes that the MWCD support is the National Rural Health Mission (NRHM) and under its umbrella the Reproductive and Child Health Program. Under this scheme many interventions have been launched to improve the quality of obstetric care for mothers. For example, a new initiative named Janani Shishu Suraksha Karyakram has been launched recently which entitles all pregnant women delivering in

public health institutions to have absolutely free and no expense delivery including Caesarean section. The initiative stipulates free drugs, diagnostics, blood and diet. The initiative also provides for free transport from home to institutional facilities in case of a referral and drop back home. Name-based tracking of pregnant women has been undertaken to ensure antenatal, intra-natal and post-natal care, including prevention and treatment of anemia. A Mother and Child Protection Card have been introduced to monitor service delivery for mothers and children.

The MWCD is addressing the management of children with severe malnutrition through Nutritional Rehabilitation Centers (NRC). As of 2011, 1,346 NRCs have been established across the country. Supplementation with micronutrients like Vitamin A & iron folic acid is being undertaken at community level. The MWCD is also addressing morbidity and mortality of children due to acute respiratory infections and childhood diarrheal diseases. The former is being addressed by administration of antibiotics and early referral to a healthcare facility and the latter is being addresses by promoting use of ORS and supplementation by Zinc.

To ensure effectiveness of above mentioned reproductive and child health initiatives, NRHM currently engages 8.49 hundred thousand ASHAs. ASHAs help to generate demand and facilitate accessing of health care services by the community, particularly with regards to diseases like malaria and Kala Azar. The NRHM has also enhanced its human resources by the addition of 61,184 Anganwadi or community level workers, 11,895 doctors, 11, 575 AYUSH doctors and 26,468 lab technicians as contractual employees.

The GOI has many health programs such as Family Planning, Reproductive and Child Health, Integrated Child Development Services, National Health Insurance for BPL households, and so on, that are geared towards benefitting women and children (Welshhoff 2006). These schemes including training and service delivery are also implemented with the help of NGOs. The government has created a three-tier NGO - small NGOs at village level, mother NGOs at district and state level and national NGOs that coordinate the efforts of the other NGOs. These NGOs tie-up with grass-root level Panchayati Raj Institutions and Self-Help Groups. But, restrictive national policies of the Indian government restrict the degree of autonomy that the NGOs have. Under various ongoing amendments of the Foreign Contribution Regulations Act of 1976, the GOI has restricted international donations to Indian NGOs. Hence, after 2006 most of the funding of Indian rural development NGOs comes from the GOI and sub-state governments. The rationale behind such efforts have been to de-politicize NGOs, prevent them from any involvement in national level advocacy issues and limit their efforts to local levels of providing services for poverty alleviation programs. This has created for a fractured, limited networked NGO movement in India. However, sometimes by acting as only 'facilitators' and not active agents or representatives of the people at the local level, NGOs have ended up empowering poor people to voice their concerns and mobilize autonomously over issues at the national level (Kilby 2011). Given the limited activism of NGOs, the struggle for women's right to life through collective action is an ongoing effort.

For all the efforts of the GOI, the health of women in India still remains poor. To understand the Indian gender health scenario it is critical to look at several gender development indicators. According to the World Bank's gender development indicators (worldbank.org.in) and Hausmann et al. (2011), adolescent fertility rate (births per 100,000 women in the ages of 15-19) was 89 in 2006 and declined only to 82 in 2009. Since contraception is the way to prevent pregnancy, it is important to look at contraceptive prevalence. Contraceptive prevalence among women aged 15-49 was 56% in 2006 and declined to 54% in 2008. Institutional births, a main focus of the NRHM, have increased from 41% in 2006 to only 47% in 2008. Pregnant women receiving pre-natal care was 74% in 2006 and increased only to 75% in 2008. Maternal mortality rate has dropped from 301 per 10,000 live births in 2001-03 to 254 in 2004-06, but is still unacceptably high. Infant mortality rate has declined from 58 per 1000 live births in 2005 to only 53 in 2008. Life expectancy at birth for females was 65 in 2006 and increased only to 66 in 2009. Similarly, while the percentage of children between 12-23 months of age that are fully immunized rose from 46% in 2004 to 54% in 2008, these levels remain unacceptably low.

Along with mother's health, it is critical to look at children's health (which subsumes female children's health). Despite India's largest child-nutrition program in the world, rates of childhood malnutrition have remained unchanged for nearly two decades. 48% of children under the age of five are stunted (low height for age), 43% are underweight (low weight for age), and 20% are wasted (low weight for height) [worldbank.org.in.] According to Swaminathan (2011), widespread malnutrition and

endemic hunger persists in India.³⁴ About half of the world's undernourished children are in India as there has been a general decline in per capita calorie consumption. Currently, 42.5% of children below 5 years of age are underweight and 40% below 3 years are undernourished. Chronic under-nutrition makes it difficult for women and children to overcome poor people's diseases such as TB, HIV/AIDS, and leprosy.

According to Kumar and Khan (2010), in the case of poor women, the high burden of fertility, despite declining trends, exacerbate overall health problems. Despite the 2005-06 NFHS figures showing the current fertility rate at 2.7, as compared to 1992-93 figures of 2.9, and despite the universal knowledge of family planning, only 49% of currently married women aged 15-49 use modern contraceptives. Numerous pregnancies, closely spaced births, unwanted pregnancies terminated by unsafe abortions, all have negative impact on women's health. In 2003, India had approximately 400 deaths per 100,000 births. This situation occurs because there is lower level of delivery at health facilities. Delivery at health facilities is better than home deliveries because complications can be taken care of by doctors. In 2005-06, 32.9% of SC, 17.7% of ST, 37.7% of OBC, 33% of Muslims and 53.4% of Christian women delivered in a health facility. Only 29% of deliveries in rural areas took place in health care facilities. Without effective primary health care, reproductive health issues become exacerbated.

According to Kumar and Khan (2010), over 100,000 Indian women die every year due to pregnancy-related factors. Of such factors, rural women are burdened with issues

³⁴ Unlike developed countries where 97% of the population is consumers, India has an adverse ratio of consumers to producers. As compared to 400 million consumers, India has about 700 million consumer-producers. From 1990-92 to 2004-06 the number of undernourished persons has increased from 210 million to 252 million.

such as excessive fatigue (48.7%), difficulty with vision during daylight (7.2%), night blindness (10.8%), convulsions that are not from fever (11.3%), swelling of the legs, body or face (24.1%), and vaginal bleeding (4.1%). Anemia is the leading cause of fatigue and 50-90% of all pregnant women suffer from it. Severe anemia accounts for 20% of all maternal deaths in India as it increases the chance of dying from a hemorrhage during labor. Since most maternal deaths happen within 48 hours after delivery, it is critical to note that according to the 2005-06 NFHS survey, 66.1% of rural women received no postnatal care after delivery. Overall, 62.9% of SC, 68.6% of ST, 59.8% of OBC, 64.1% of Muslim and 39.4% of Christian women did not receive postnatal care. Also, 80.7% of the lowest quintile and 72.3% of the second lowest quintile of poor people did not receive postnatal checkup. On top of that, overall, 23.5% of women in the public sector, 15.4% of women going through NGO or trust hospital/clinic, and 15.4% of women in the private health sector did not receive postnatal care.

Women's and children's health is severely affected by malnutrition. While malnutrition in India is found among all segments of the population, poor nutrition among women germinate in childhood and continue throughout their lifetimes due to gender discrimination. This is exacerbated in lower caste and economically weak families. According to the NFHS 2005-06 statistics, percentage of stunted women and children below-3 standard deviations from the International Reference Population median, was 23.4%, while those with a percentage below -2 standard deviation was 48%. The figures for wasting in the corresponding categories were 6.1% and 19.1% respectively. For underweight, the corresponding figures were 16.4% and 43.1%

respectively. Overall due to discrimination, early childhood mortality for girls in rural areas was higher than boys - 63.9 as compared to 60.7. Incomplete development due to discrimination increases the hazards of obstructed deliveries during childbirths (Kumar and Khan, 2010).

According to De et al. (2011), nutritional deprivation leads to altered gene expression and as a result the child's future health maybe influenced in intra-uterine experience. Risks of non-communicable diseases such as diabetes and hypertension increase in adult life depending on deprivations during fetal development. However, micronutrient deficiency, including iron, remains a major nutritional problem among women of childbearing age group in India as is evident from the fact that more than 50% women and 74% of children between the ages of 6-34 months are anemic. This situation gives rise to high risks of low birth weight, anemia, and postpartum hemorrhage, all of which contribute to maternal and neonatal mortality.

According to Upadhyay et al. (2011), 15% of all maternal deaths are attributed to anemia. According to Vyas et al. (2009), the prevalence of anemia among girls aged 15-19 years in India is 56% and yet, girls in this age-group account for 17% of total fertility in India. Provision of iron and folic acid to pregnant women is an integral part of the Reproductive and Child Health program in India. Although 65% of mothers receive such supplements, only 23% consume them for at least 90 days, very likely due to frequent gastro-intestinal side effects of iron supplements. Hence, the authors recommend the development of low-cost, culturally palatable leaf concentrates that contain micronutrients and can provide better bio-availability.

Using data from National Nutrition Monitoring Bureau's data from 1998-99 and 2005-06, Rao et al. (2011), finds that the nutritional intake of all foods except for vegetables, roots and tubers was lower than suggested level among rural women and tribal women. Hence, there was hidden hunger due to micronutrient deficiency during pregnancy and lactation. The prevalence of goiter was relatively higher among tribal women (4.9%) than their rural counterpart who had 0.8% prevalence. Tribal women were particularly vulnerable to under-nutrition and hence, suffered more from chronic energy deficiency (56%) compared to their rural counterpart (36%).

According to Saravanan et al. (2011), in India, one-third of women in reproductive age group of 15-49 are acutely undernourished and 58% of pregnant women have anemia. 61% of births take place at home and trained birth assistants (TBAs) assist 37% of such births. TBAs arose during the 1970s and 80s when the WHO promoted their training to reduce maternal mortality rates. the extent of dependence on TBAs for assistance during delivery is higher in rural areas (42%) as compared to urban areas (20%). 53% of poor rely on TBAs as opposed to 9% of affluent households. However, since 1990s, TBA training has been increasingly seen as irrelevant and ineffective as maternal mortality rate did not reduce. Hence, many donor agencies withdrew their funding. Thus, significant gap continues in neo-medieval governance of women's reproductive health.

The above mentioned gender health issues are exacerbated by violence against women. In India, according to NFHS 2005-06, 37.2% of ever-married women between the ages of 15-49 have faced physical and sexual violence (the most under-reported form

of violence) from husbands. Violence significantly contributes to HIV/AIDS problems (John et al. 2011). Women often do not have the power to negotiate safe sex and falling prevalence of contraceptive use is a key indicator of the growing problem of HIV/AIDS. All of the above facts contribute to a poor Gender Development index rank of 113 out of 177 countries, for India (Swaminathan 2011).

Situation of gender health at the sub-state level is not encouraging. In comparing Maharashtra and West Bengal, Jain (2010), points out that in 1996 Maharashtra's health expenditure as percentage of total expenditure was 4.56% but, by 2005 it had declined to 3.51%. In 1996, West Bengal's contribution was 6.43% but, by 2005 it had declined to 4.93% due to the pace of neoliberal economic reforms. Considering this change in health expenditure certain statistics become critical. In Maharashtra, in the periods between 1999 and 2003 the female life expectancy at birth was 67.6 years and female infant mortality rate per 1,000 live births in 2005 was 37. In comparison, West Bengal's female life expectancy at birth was 65 years and female infant mortality rate was 39. Bengal appears to have a worse scenario than Maharashtra despite having higher health expenditure. In consideration of its economic rank as a high income state in comparison to Bengal's low to middle-income status, however, Maharashtra performed poorly on the indicators of life expectancy and infant mortality. In inter-state ranking, Maharashtra's economic growth rank was high at 3 in comparison to West Bengal's 10. But, in case of life expectancy at birth, Maharashtra had a worse rank of 3 as compared to West Bengal's

rank of 7. In case of infant mortality, Maharashtra had a worse rank of 2 as compared to West Bengal's 3.5.³⁵

Given the status of Maharashtra as a fast-growing state it is critical to look at its ranking on several key health indicators. According to Mishra et al. (2008), based on mid-2000s data, among all states in India, Maharashtra ranks 10 in IMR (infant mortality rate); 9 for full immunization of children; 32 for prevalence of childhood pneumonia; 15 in death rate; 4 in terms of life expectancy; 12 for reproductive healthcare; 13 in terms of women who needed to visit health facility but did not; and 30/14 for RTI/STI (reproductive or sexually transmitted) infections for females/males.³⁶ Among 20 states, Maharashtra ranks 14 for BMI of women below normal; and 10 for underweight children under the age of 3. Out of 21 major states, for treatment in rural public facility OPD/IPD (outpatient/inpatient department) Maharashtra ranks 15/16; burden of health expenditure OPD/IPD is 11; loss of income OPD/IPD is 12/6; antenatal care in public facility is 14; childbirth expenditure is 10; and antenatal care expenditure is 15. Two of Maharashtra's fast growing districts like Pune and Nasik also show negative trend in terms of human development. For example, compared to Maharashtra's district average of 34 Pune's IMR was 42 and Nasik's was 50.

³⁵ This disjuncture between growth and welfare is confirmed by IBRD Report (2011). According to IBRD Report (2011), when comparison is made between the periods of 2001-03 and 2004-06 for maternal mortality per 100,000 live births, it becomes evident that in Maharashtra there has been a decline from 149 to only 130 and in West Bengal the decline has been from 194 to 141 (a steeper drop than Maharashtra).

³⁶ RTI/STI are an indicator of women's powerlessness in sexual decision-making. In 2002-03, in Maharashtra, 25.4% of women had at least one symptom of RTI/STI as opposed to 8.9% of men. However, 47.9% of women sought treatment as opposed to 69.2% of men.

According to Mishra et al. (2008), in 2005 in Maharashtra women with all kinds of anemia accounted for 51.1% and pregnant women in rural areas with anemia accounted for 56.4% of the population. In 2005, children with all kinds of anemia accounted for 76.8%. Among girls in the age-group of 1-4 anemia is the third most important cause of death while among boys it is the eighth most important cause of death. According to Sonowal (2010), Maharashtra has a more than 60% prevalence of underweight and stunted children in the ages of 1-5.³⁷

Overall, poor gender health scenario shows that in India, there has been a severe disjuncture between growth and welfare. There is a thriving pharmaceutical sector, but, women still continue to suffer from lack of proper access to healthcare. For the most part, withdrawal of the government from provision of public services has not led to a better outcome of health for women.

State retrenchment and the rise of CSR as alternate modes of governance of health can also be seen in the context of neo-medieval governance of neglected and neglected tropical diseases. This is explored in the next section.

Neo-medieval Governance of Neglected and Neglected Tropical Diseases

Neo-medieval governance of diseases involve state and other international actors (including corporations) trying to provide access to health and ensuring the right to health for the most disadvantaged population - the poor communities of women and children of India. According to Khosla and Hunt (2012), the state has the primary responsibility for

³⁷ Children in West Bengal are more vulnerable to vitamin A deficiency of above 6% that increases susceptibility to infections, causes blindness and stunting. West Bengal also has 95% of its pre-school children suffering from anemia because of iron deficiency.

ensuring the right to the highest attainable standard of health, including access to medicines. However, this responsibility is a shared one where other private entities like pharmaceutical companies have the responsibility of internally conducting research for neglected and NTDs or supporting external research and development. Since access to medicine is a basic human need and right, pharmaceutical companies have strong moral obligation to ensure that cheaper drugs are available to the poorest population; that they avoid corruptive practices that hinder people's access to medicines; and ensure specifically transparency, monitoring and accountability of their practices as part of their corporate social responsibility. It is this overlapping authority of public and private entities in ensuring poor women's right to health that is explored in this section. The exploration shows that both states and pharmaceutical companies have a mixed track record when it comes to providing access to medicines for the poor. Especially pharmaceutical companies tend to undermine their corporate social responsibility and their good efforts at helping the poor by often putting profits ahead of welfare for the poor. This focus on utility over life short-circuits human right to life.

Governance of Neglected Diseases

Neglected diseases include HIV/AIDS, TB, malaria, diarrheal diseases, bacterial pneumonia and meningitis. In India, 30% of the disease burden is contributed by infectious diseases (John et al. 2011). A significant cause of such infectious diseases is environmental pollution. Pollution contributes to outdoor and indoor air pollution through an increase in tiny particulates that can be inhaled. Pollution leads to chemical and microbial contamination of water, soil and food. Microbial infections include fecal oral

infections, bacteria, virus, helminthes and protozoa. Chemical infections include arsenic, pesticides, fluoride and other chemical toxins. This is exacerbated due to lack of safe drinking water supply, hygienic toilets, drainage and waste management. This contributes to water-borne diseases such as malaria and diarrhea; and air-borne diseases such as TB. Lack of drainage, waste management, and peri-domestic issues lead to vector breeding and hence, to diseases such as malaria (Nath 2007). HIV/AIDS is a sexually transmitted disease.

In this section, we highlight the three major diseases HIV/AIDS, TB and malaria. States have the primary responsibility of ensuring the right to health. Under international law, states have the primary responsibility in providing the highest standard of health, including providing access to medicine. When it comes to government action in relation to neglected diseases, in India, neglect rather than active intervention is more prevalent. For example, AIDS is an epidemic, but the GOI refuses to acknowledge it as an epidemic. It also refuses to invoke the flexible compulsory licensing clause of TRIPS in order to bring down drug prices and procure drugs for the poor. This is despite the fact that India acts as the pharmacy to the rest of the world when it comes to providing cheap anti-retrovirals (ARVs) that treat HIV/AIDS.

The first AIDS case in India was detected in 1986 and currently India has the world's third largest infected population. National household survey in 2005-06, revealed that 2.39 million people in India are living with HIV, of which an estimated 39% are female and 3.5% are children (www.avert.org). However, according to John et al. (2011), in 2006, UNAIDS estimated that there were 3.4-9.4 million people living with HIV, and

of these 1.6 million were women of age 15 and over. Overall, women and girls account for 40% and children account for 4% of the HIV burden in India. The AIDS epidemic follows what is called a 'type 4' pattern. This is where new incidences occur first among the most vulnerable population (such as female sex workers and injecting drug users). It then spreads to what is called the 'bridge population' such as the clients of sex workers who tend to be migrant workers and truck drivers, and then finally it spreads to the general population. The overwhelming majority of infections in India occur through heterosexual sex, with married men acting as bridge population by infecting their wives who often do not have the power to dictate the use of protective measures such as condoms in their sexual relations because of patriarchal subservience.

Affecting the most productive age group of 15-44, AIDS has most severe prevalence in the south and north-east of India. Hence, antenatal clinic HIV prevalence in 2007 was 0.50% in Maharashtra while it was 0.00% in West Bengal; STD clinic HIV prevalence was 11.62% in Maharashtra while it was 0.80% in West Bengal; female sex workers' HIV prevalence was 17.91% in Maharashtra while it was 5.92% in West Bengal. Maharashtra is among the top 5 high adult HIV prevalence states (www.avert.org).

The GOI has taken some actions against HIV/AIDS, especially after the Supreme Court under petition from NGOs directed GOI to provide second-line anti-retroviral treatment to all AIDS patients in the country (en.wikipedia.org). In 2010, the GOI scaled up its free anti-retroviral treatment program to 269 centers and as of March 2010, 315,460 patients are receiving free treatment. Second line ARV treatment has been

initiated in Centers of Excellence and more than 1,100 patients have been enrolled. With widespread prevalence, Maharashtra currently has 43 centers and a total of 70,511 patients receiving ARV treatment.

One should note that in line with efforts to treat patients with ARVs, the Indian National AIDS Research Institute (NARI) is developing women controlled methods for prevention of HIV. A key development of NARI is vaginal microbicide that can take the form of medicinal herbal product (Mascarenhas 2009). Some authors, like John et al. (2011), feel that the GOI is managing the AIDS problem in a controlled manner.³⁸

Like AIDS, the GOI's action against TB has been meager. India's contribution to National TB Program in 2010 was only 1.2% of government health expenditure and represented a funding gap of 17% of the budget. According to Mukhopadhyay et al. (2011), India has one-fifth of the global incidence of TB. With 400,000 deaths per year, TB costs the country more than Rs. 120,000 million per year. According to Baru et al. (2010), in 2005, the incidence of TB per 100,000 people was 168. Moreover, TB is not a notifiable disease by law and any lapses in drug regimen increases Multi Drug Resistant TB and creates for more public health risk (Lonnroth et al. 2010). In January 2012, 12 cases of Total Drug Resistant TB were found in the Hinduja hospital in Mumbai. All the patients were poor slum dwellers. There is also a critical lack of treatment of children

³⁸ Some Indian companies have also stepped into help on the HIV/AIDS front. For example, Wockhardt, though it does not produce ARV medications, has teamed up with the NGO Harvard Medical International, a subsidiary of the Harvard Medical School, to create Wockhardt-HMI HIV/SIDA Education and Research Foundation (WHARF.) WHARF trains healthcare providers in using global standards in HIV/AIDS management and works with them on overcoming attitudinal (stigma) and economic barriers to this debilitating disease. Since its inception in 2002, WHARF has trained 5,000 doctors, nurses, volunteers and paramedic technicians. To broaden its outreach, WHARF has teamed up with national and regional programs and has reached grassroots organization caregivers and hospitals (Khan, 2008).

with latent TB infection, the existence of which is very difficult to establish definitively in the first place (Rekha et al., 2010). All such factors have led to increased prevalence of TB.

Most critically, the GOI has failed to tackle the environmental pollution that significantly contributes to TB. Environmental pollution through air toxins including volatile organic compounds and polycyclic air-borne hydrocarbons has a deadly impact on health. For example, carbon monoxide impairs the oxygen carrying capacity of the blood; sulfur dioxide and nitrogen oxides increase the susceptibility of respiratory systems and impair immune responses and lead to increased mortality. The WHO estimates that globally out of the 500,000 deaths caused per year due to exposure to particulate pollution, 20% occur in India. Calcutta has total suspended particulate matter of 344.3 and Mumbai has 246.2. Both cities exceed the critical level of 210 as determined by WHO standards. All such things lead to acute respiratory infections in young children; adverse pregnancy outcomes (low birth weight, stillbirth or neonatal death) for women exposed during pregnancy; chronic lung ailments (bronchitis or asthma) and associated heart maladies; and diseases of the eyes such as Trachoma that causes blindness (Nath 2007).

GOI has made some efforts in tackling TB. The GOI and CSIR has undertaken Open Source Drug Discovery (OSDD) as a global initiative to discover neglected diseases and NTDs. It provides a collaborative platform for scientists, doctors, software professionals, students and others to facilitate drug discovery (Chaudhuri 2010).

Recently, under this program, India succeeded in decoding the TB genome, primarily

with the help of undergraduate students. OSDD represents an alternative to standard version of IPR. OSDD's clinical trials will be openly posted online, thereby eliminating private sector demands for data exclusivity. In this program, contributors can seek to gain standard IPR, but on the condition that these are made available to the developing world through non-exclusive license (Bhardwaj et al. 2011).

According to Kumar et al. (2007), in India, nine Anopheline vectors are involved in transmitting malaria. About 2 million confirmed malaria cases and 1,000 deaths are reported annually. However, WHO South East Asia Regional Office has a higher estimate of 15 million cases and 20,000 deaths. India contributes 77% of the total malaria in Southeast Asia. Most of the malaria burden is borne by economically productive ages. The Indian sub-states inhabited by ethnic tribes are entrenched with stable malaria, particularly *P. falciparum* with growing drug resistance. *Plasmodium falciparum* and *P. vivax* vector related cases lead to multi-organ involvement and dysfunction. The profound impact of complicated malaria in pregnancy includes anemia, abortions, low birth weight in neonates, still births, and maternal mortality. All such factors have seriously increased losses inflicted due to loss of productivity.

Despite innovative research and a thriving pharmaceutical sector, there are hardly any drugs or vaccines available in the market to treat the poor in India. The neglect of major neglected diseases continues despite biotech studies showing that ARV drug usages can have overlaps. When drug usages have overlaps in treating diseases, drugs become cheaper for the government to procure. For example, ARV like ritonavir, saquinavir, and indinavir, have been found to be effective in inhibiting malaria parasite

(Andrew et al. 2006). Despite the possibility of procuring drugs cheaply, malaria is a major public health problem in India with as much as 95% of the population exposed to infection (Bhattacharjee and Bhattacharjee 2011). With a highly thriving pharma sector creating ARVs, India should have been better able to procure drugs for the poor and prevent the growth of malaria resistance among the infected population.

Beyond GOI'S efforts, some hope and relief to the poor comes from global efforts at combating neglected diseases. Such efforts are made by developed states, international institutions and MNCs. Efforts include those made by the Global Fund to Fight AIDS, TB and Malaria; the US fund PEPFAR to fight against AIDS; and the AIDS Vaccine for Asia Network (includes an alliance of pharma companies like Boehringer Ingelheim, Bristol-Myers Squibb, GSK, Merck, Roche, Gilead Sciences and UN organizations such as, UN Population Fund, UN Children's Fund, UNAIDS, WHO, and WB) [Srivastava et al. 2010]. According to Welshhoff (2006), the World Bank has contributed \$640 million to fight AIDS in India. The Gates Foundation has also proffered \$200 million to fight AIDS and is working with 150 NGOs in India.³⁹

The difficulty that lies with all of above mentioned global programs is sustained funding under economic crisis, issues of corruption, and sustainable success of any breakthroughs that may be made. An example of non-sustainability is the latest failure in the malaria vaccine that was discovered through collaboration between the PATH Malaria Vaccine Initiative supported by US\$ 20 million from the Bill and Melinda Gates

³⁹ Also notable are government to government North-South collaborations, like the Indo-US initiative on non-communicable diseases by ICMR, Indo-US Vaccine Action Program, and Indo-US Maternal and Child Health Initiative (Srivastava et al. 2010).

Foundation and GSK. The vaccine proved to be untenable in the vast Phase III clinical trial being conducted in Africa. The vaccine was found to be 50% effective in the first 3-4 months for children of 6-12 weeks of age and then was found to stop working after about 6 months. The alliance has not given up hope or work on the vaccine. But, this incidence demonstrates the difficulty of fighting such diseases (Butler 2012).

Another issue of sustainability of international efforts comes from issues of transfer of new affordable technology to poor countries. For example, EU funding for Pharma Planta Project of 2004 has made a serious breakthrough in creation of a biotech ‘protein-drug’ in the form of vaginal microbicide from genetically modified tobacco whole-plants to fight AIDS. The breakthrough was made with low-cost technology and the ‘hope’ is that it would be transferred to developing countries. But, given the track-record so far of knowledge economy based trade for a ‘low-income country’ like India (Beall and Kuhn 2012) the hope is very slim (Valenza 2013; Reddy 2013).

Beyond purely global efforts, there are local and global efforts at tackling neglected disease. This can be seen from the following example. In a public-private partnership with a host of national and international research institutes like the All India Institute of Medical Sciences, DBT, the Gates Foundation, Program for Appropriate Technologies in Health, and Center for Disease Control, USA, the Indian vaccine-maker Bharat Biotech has been the first to indigenously develop rotavirus diarrhea vaccine.⁴⁰ The vaccine is priced at a cut-price of US\$ 1 as compared to GSK and Merck’s price of

⁴⁰ According to Nath (2007), per year, diarrhea has led to 4 million cases of deaths.

US\$ 8 per dose for the UN and US\$ 60 for private markets. The vaccine is currently under Phase III trials and will be commercialized by 2015. The company will supply the vaccine to Global Alliance for Vaccine and Immunization (GAVI) and other UN agencies after getting the required license from India's Drug Controller General and from the WHO.^{41 42}

Overall, the governance of neglected diseases leave a lot to be desired. Such governance needs to be rectified so that the needs of the poor can be better met.

Governance of Neglected Tropical Diseases

Neglected tropical diseases (NTDs) are diseases that affect the poor most. There are at least 15 NTDs such as dengue; helminth infections like roundworm, hookworms, tapeworms, schistosomiasis and lymphatic filariasis; leprosy, buruli ulcer, and so on. In India, lack of water and food safety, domestic and personal hygiene contributes to microbial diseases such as diarrhea, cholera, typhoid, enteric fever and hepatitis. Lack of drainage, waste management, and peri-domestic issues lead to vector breeding and hence, to diseases such as filarial dengue, and encephalitis (Nath 2007). While these are all poverty-related factors that contribute to diseases, according to Lobo et al. (2011), NTDs

⁴¹ The company also has a pipeline for Typhoid conjugate vaccine, Japanese Encephalitis and chikungunya. The typhoid vaccine is undergoing WHO pre-qualification to enable supply to UN agencies (Amirapu, 2011).

⁴² Himalaya Drug Company has a history of working with NGOs for community development. It has entered into a contract farming agreement with DHAN, an NGO working with marginalized communities in South India for sourcing herbs (some of which may be used for medicines for NTDs). It also works with Gram Mooligai Company Ltd., promoted by a group of NGOs working for the conservation and optimal use of medicinal plants by engaging small and marginal farmers for sustainable livelihoods. The company has also helped create Sami Labs Initiative which started large-scale cultivation of the herb *Coleus forskohlii* and helped create a huge cooperative venture of farmers and farm laborers. Currently, the initiative covers several states including Maharashtra.

actually promote poverty (rather than simply being the result of poverty) because of their adverse impact on child development, pregnancy outcome and worker productivity.

NTDs receive minimum attention in terms of research and development (R&D). The time, energy and cost (including cost of failure) in developing drugs, vaccines, diagnostics, microbicides, vector-control products and clinical trials of such products are enormous. Very little funding is available for such diseases and when it is available, it is rarely allocated in a manner likely to move products through pipeline to patients (Moran 2011). One reason for such obstruction is interlocking patent protections that create for the ‘Tragedy of the anti-commons.’ This means that the transaction cost of negotiating multiple layers of patents needed to make progress in creation of new drugs is increased due to IPR (Boyer 2010). The more delay there is in development of cheap and safe drugs, the less there is adherence to drug regimen and hence, there is increasing strains of resistant parasites. Thus not only is knowledge creation prevented by IPR, it increases the risk of public health and costs in terms of human capital development.

In comparison to efforts made in neglected diseases, R&D for NTDs relies only on a handful of global funders, with 12 organizations accounting for 86% of global NTD funding and two major donors - The National Institute of Health and Bill and Melinda Gates Foundation accounting for 49% of funding. The funding comes mainly from US investors, both public and private, and from innovative developing countries like India (Moran 2011). Moreover, according to the Intellectual Property and Science division of Thomson Reuters’ latest study, India has shown the steepest growth in new research on NTDs, with a special focus on dengue vector (thomsonreuters.com).

According to Satyanarayana and Srivastava (2007) less than 10% of the US \$30 billion global health research resources is spent on developing country diseases that account for 90% of global health problem. This imbalance in the international arena is called the '10/90' gap. According to Moran (2011), pharmaceutical companies' absence is marked in the NTD's product development, except for dengue. However, according to Allotey et al. (2010) a number of pharmaceutical companies have donated products⁴³ or are supporting public-private partnerships for R&D, under their Corporate Social Responsibility programs. Similarly, UK charity Wellcome Trust has agreed to collaborate with Merck & Co. to allocate substantial fund for a joint, not-for profit research center in India to develop inexpensive anti-poverty vaccines for NTDs (Hoetz and Pecoul 2010). Despite the 10/90 imbalance, efforts are thus being made at the international level to tackle the scourge of Type II and III diseases.

Several global health initiatives have also been launched to address NTDs control, elimination or eradication (Allotey et al. 2010). On January 30, 2012, Bill Gates joined the head of the WHO, 13 drug companies (including GSK) and others in pledging to eradicate or control by 2020 ten of the world's nastiest diseases such as the guinea worm, sleeping sickness, schistosomiasis that causes tissues to rot and cripple the organs of human beings. The Bill and Melinda Gates Foundation will provide \$363 million of the \$785 million planned for fighting these ailments. Drug firms will donate \$1.4 billion for treatments each year. Since the diseases often plague the same places, the proposed plan

⁴³ According to Lobo et al. (2011), free anti-leprosy drugs are being provided by WHO due to generous grants from Nippon Foundation and the Novartis Trust for Sustainable Development.

is to dispense several drugs together in order to save money. For example, administering azitromycin (for blinding trachoma), albendazole (for elephantiasis and soil-transmitted worms), ivermectin (for elephantiasis and river blindness) and praziquantel (for schistosomiasis) all at once could cost half as much per patient per year as compared to stand-alone programs for each of these diseases (The Economist 2012).

With the help of global funders, an elimination program of visceral leishmaniasis, an NTD, has been launched on the Indian sub-continent. The program seeks to be effective through passive and active detection, early diagnosis and treatment, integrated vector management (including indoor residual spraying and insecticide-treated bed-nets) and vector surveillance, as well as environmental management and social mobilization. But, such efforts have still not been optimized to reduce toxicity and prevent emerging drug resistance in resource-poor settings (Hotez and Pecoul 2010).⁴⁴

Global elimination of NTDs programs includes also efforts made by the WHO, a Global Network for NTDs, Research Partnership and Research Initiatives, and so on. However, global initiatives on NTDs continue to be plagued by severe lack of coordination across various players - researchers, policymakers, clinicians, public-private partnerships, donors and patient advocacy groups (Allotey et al. 2010).

Despite global efforts, problems of NTDs continue in India. In India, early success of malaria control was not sustained and visceral leishmaniasis prevalence has increased. Inadequate containment of the malaria vector has resulted in recurrent

⁴⁴ In resource poor-settings gender dynamics can support or hinder exposure to disease, access and ability to seek health care, particularly due to stigmatization, social isolation and disfigurement (Allotey et. al, 2010).

outbreaks of dengue fever and re-emergence of chikungunya virus and typhus fever. Other infectious diseases caused by feces-transmitted pathogens (enteric fevers, cholera, hepatitis A and hepatitis E viruses) and zoonoses (rabies, leptospirosis, anthrax) are not in the process of being systematically controlled. It is important to note that Maharashtra has high incidence of dengue fever while Bengal has high incidence of malaria, cholera and typhoid (John et al. 2011).

State has the primary responsibility of ensuring access to medicines. But, in India governmental efforts regarding NTDs fall far short of goal. For example, Typhoid VI vaccine is manufactured in India and is popular among private pediatric practice, but is not part of the National Immunization Program (NIP). Similarly, killed and live virus vaccines are used in private pediatric services for hepatitis A, but such vaccines are not part of the NIP. Hence, it is not surprising that affected pregnant women having bad obstetric and fetal outcomes and mortality rates is as high as 30%. Also, bivalent-killed cholera vaccine manufactured in India is licensed but not used in the public healthcare system. The GOI covers Japanese encephalitis immunization in 62 endemic districts. But, such efforts have not been sufficient. Diphtheria has emerged again and is affecting children (John et al. 2011).⁴⁵

⁴⁵ GOI has failed to provide good immunization coverage to its poor population. As Baru et al. (2010) points out, in 2005-06, full immunization in rural areas was 38.6%, among the lowest quintile in India it was 24.4%, among the SCs it was 39.7%, and among the STs it was 31.3%. In 2005-06 the all-India average for full immunization coverage was 44%, representing only 8% improvement from 1992-93. Recently, India was polio-free of new cases for a year, and hence, is being seen on track to be declared by the WHO as an area free of this endemic disease. India has to maintain this status for three years to get the actual accreditation (McGivering 2012).

India has had a couple of rare success in dealing with NTDs. India has 40% of the global disease burden of lymphatic filariasis and loses almost \$1 billion annually in DALYs (disability adjusted life years). India's National Vector Borne Disease Program for lymphatic filariasis is impressive because of the scale of its mass drug administration. The overall prevalence was cut in half between 2004 and 2008 and today the prevalence is 0.53%. In India, leprosy accounts for 40% of world's registered cases and the GOI has successfully tackled this disease through multi-pronged approach including the provision of drugs. (Lobo et al. 2011).

Overall, the disease burden in India is quite high and affects the development of productive human capital. In 2000, DALYs related to communicable diseases were approximately 85 per 1000 person in India. Intestinal nematode infections have caused 2.2 million deaths and caused infections in about 500 million people. Due to schistosomiasis, about 200 million people are infected and 20 million suffer from severe consequences (Nath, 2007). According to Krishnamoorthy et al. (2009) for the year 1998, DALYs lost per million population due to malaria, leishmaniasis, lymphatic filariasis, dengue and Japanese encephalitis was 586, 1160, 2097, 359 and 67 respectively. Lymphatic filariasis was found to be a major public health concern as it imposed a heavy burden by contributing about 49% of the total 4294 DALYs lost per million populations in India due to the vector borne disease. During 2006, the national burden of chikungunya was estimated to be 25,588 lost DALYs. The epidemic that emerged in December 2005 led to an overall burden of 45.26 DALYs per million. The situation was worsened by the fact that chikungunya creates for extended morbidity due to persistent arthralgia or a

form of arthritis. By using the minimum wage fixed by the GOI, Rs. 391 million was estimated (reality being much higher) to be the minimum cost of productivity loss in terms of foregone income. Thus, neglect of diseases has meant severe loss of human capital development.

Overall, from the governance of NTDS and neglected diseases, it can be seen that resource allocation for health equity in a free-market economy has been far from perfect. There are huge gaps in achieving health equity. This gap is worsened by negligence of state and corrupt practices of corporate market actors.

Problematic Behavior of Corporations and States

Both states (developed and developing) and corporations have responsibilities towards ensuring the right to health. As we have seen in the previous section, states and corporations have a limited track record of fulfilling such responsibilities with respect to neglected diseases and NTDs. What is more problematic is the irresponsible behavior of these two actors when it comes to ensuring the right to health. In this section we look at the problematic behavior of these two actors that act as barriers to ensuring access to medicines.

In neo-medieval governance actors often contradict themselves and behave problematically as they face opposing incentives of social responsibility and utilitarian motive of profit. Let's first look at some examples of pharmaceutical companies' problematic behavior in the global arena. Pharmaceutical companies are not public health agencies. Hence, their cooperative ventures into helping the poor as part of their CSR

activities are laudable. However, trust in such companies is difficult to establish, because they also have a history of defrauding consumers. For example, in July, 2012, GSK pleaded guilty to criminal charges in the US for health care fraud and agreed to a \$3 billion settlement, the largest payment by a drug company. Similarly, Merck settled a nominal pricing fraud case by paying \$650 million in settlement and Pfizer settled a case of health care fraud for \$2.3 billion (en.wikipedia.org). Although these cases took place in the US, it is contra the image that such companies are projecting in trying to help the poor consumers of developing world.

The image of the pharmaceutical companies are becoming more tarnished as they pay generic companies to delay launching of cheaper generics versions of brand-name drugs in the USA. These 'pay for delay' profits pharmaceutical companies but harm consumers by delaying their access to cheaper generics. Such actions extend the patent monopoly of drug companies and keep the prices of drugs high. Such payments also smack of illegal collusion between the brand-name company and the generic-maker and brings out the lack of transparency and accountability of pharmaceutical companies (articles.washingtonpost.com). The American Medical Association believe that such payments to generic-makers undermine the balance between spurring innovation through patents and reducing prices through fostering competition of generics (Holland and Johnson, 2013).

As transparency increases at the global level, anti-poor activities of pharmaceutical companies are becoming exposed. At the global level, there are renewed efforts at creating transparency and reducing disparity in prices charged for vaccines.

This effort is reflected in the UNICEF's attempts to reveal the prices it pays to different companies for vaccines. UN Children's Fund and GAVI collects billions of dollars from donors to help UNICEF pay for vaccines for children. The price differential revealed through such transparency showed that for an important compound vaccine that targets diphtheria, tetanus, whooping cough, hepatitis B, and Haemophilus influenzae the Indian company Serum Institute charged \$2.20 in comparison to Johnson and Johnson's charge of \$3.20. Such transparency also revealed that the UNICEF has to resort to subsidies to entice big companies, such as Pfizer and GSK to keep supplying vaccines like pneumococcal vaccines for poor countries (Mcneil 2011). This reveals that big pharma companies' professed altruism can be highly shallow.

The global image of pharmaceutical companies is negative due to the above mentioned activities. However, the image of pharma companies is also negative due to their activities at the local level in India. Following are some examples of such negative behaviors. Such behaviors are primarily profit-seeking. Such behaviors are anti-poor in that they act as barriers to access to medicines.

Pharmaceutical companies try to extend monopoly patent protection through evergreening activities. This means that they seek to make little tweaks in an existent medicine and call such changes genuine new innovation in medicine. Efforts at creating evergreen drugs by pharma companies are a violation of TRIPS clauses and a problem that the GOI has to be constantly vigilant against. For example, based on the lobbying efforts of an Indian organization, Intellectual Property Initiative for Medicines, Access and Knowledge (I-MAK), the Mumbai patent office rejected patent claims of a vital

second-line ARV drug needed to counteract resistance to first-line cocktail drugs. This drug Kaletra of Abbott Laboratories is a combination of two drugs lopinavir and ritonavir and a patent would have been an attempt at evergreening. Abbott has a history of highly unfair drug pricing of ARV for developing countries (Bosley, 2011). The GOI's vigilance comes at a cost. The MNCs exert pressure on the GOI to avoid taking such steps. The pressure is amplified through their home governments who can use the threat of raising a dispute in the WTO forum against regulatory provisions not suited to them by labeling them as trade barriers. This has led to increasing 'trade creep' (Saxena 2011) in arenas of human rights concern, such as, the right to health.

The system of drugs innovation through clinical trials is being plagued by abuse. Unauthorized clinical trials are on the rise in India and deaths and disabilities are occurring among the poor people on whom the research is being conducted. The poor regulation environment and monitoring has meant that pharma companies have repeatedly violated prescribed guidelines and regulations. According to the WHO, in India, on average 10 people have died every week in clinical trials since 2006 (www.dw.de). The GOI has started taking notice of abuse of clinical trials. The GOI has enacted the Clinical Establishment Registration and Regulation Act 2010 to get a better grip on medical ethics. It has also enacted the compulsory Clinical Trials Registry-India in June 2009. But, obviously enforcement depends on having the resource capacity and political will to enforce it at state and sub-state levels, which India lacks. Moreover, contra knowledge economy prediction, there is little technology transfer during such innovations since the MNCs have complete control over clinical trial design, access to

raw data and its interpretation (Saxena 2011). Lack of technology transfer prevents further research and development of medicines.

India lacks a functioning drug regulatory system because of lack of resources (Lexchin 2012). For example, India should have 2,900 drug inspectors but, in reality has 700. Under such circumstances unethical marketing practices tend to thrive. A large number of medicine sold in India are irrational, found in irrational combinations, dangerous, or just useless. Many of these drugs have already been removed from developed country markets for safety reasons and yet, they continue to be sold in India. Advertising for drugs are often found to be misleading because they are exaggerated, ambiguous, outright false or controversial. Advertised drugs tend to present the least amount of information about safety, including contraindications, adverse reactions, interactions and precautions. Hazards tend to be glossed over or totally ignored. Moreover, in India, patients rely heavily on doctors for drug information. Doctors tend to receive information about drugs through poorly-trained sales representatives who rarely mention drug interactions and adverse reactions. Doctors are influenced not only by sales representatives, but, also by free drug samples, gifts, meals, invitations to meetings and financial sponsorship of continued medical education events. Given this situation, there is dire need for state regulation of corporate activities. However,

even were developing countries to try to enforce strong regulatory measures, policies are often difficult to maintain on the face of extreme pressure from the pharmaceutical industry and some Western governments (Lexchin 2012: 138.)

Pharmaceutical companies refuse to ‘work’ their patents locally in India (Reddy and Kadri 2013). In the post-TRIPS period there has been a tremendous growth in patent applications and grants in India with most of the patents being owned by foreign inventors. However, many of these patents are not ‘worked’ on a commercial scale in India even though generally India has a favorable manufacturing environment, especially due to availability of highly qualified personnel. Hence, patents do not benefit society by creating jobs and increasing foreign exchange flows. The patent holders are using the Indian market only for economic gain with no actual benefits in the form of transfer of technology from inventive activity. The Patent Act of India provides remedies including compulsory license, revocation and fine, if the patent holder fails to comply with the provisions of the law relating to local working of patent. However, these remedies are rarely enforced. The Patent Office simply registers patents and is unwilling to provide information of working or non-working of patents. On top of that, a survey of the top selling drugs in India for the period 2007-10 shows that the provisions of the patent law have been breached either by non-filing of the local working information or by filing incomplete information. The inability to distinguish whether a product has been imported or made locally means that there is barrier to claiming of compulsory license. So far, only one compulsory license has been granted by the Patent Office for failing to work the invention locally. In Natco Pharma Ltd vs. Bayer Corporation, the Controlled General of Patents granted compulsory license to manufacture and market the anti-cancer drug Nexavar. The drug is proposed to be sold at Rs. 8,880 for a dose of one month as opposed

to the much higher sell price of Rs. 280,428 by the German company.⁴⁶ This example clearly shows the benefit of compulsory license in bringing down drug prices.

Drug companies have also sought to impose patent linkage though it is restricted in TRIPS through the Bolar Provision. Patent linkage is the practice of linking drug-marketing approval of a generic medicine to the patent status of the originator's reference product and not approving the generic medicine prior to the expiration of patent term unless consented to by the originator. Prior approval ensures that cheap generic medicine is brought to market as soon as the expiration of a patent occurs. Without prior approval, access to generic drugs is delayed and poor people cannot access cheap medicines. Currently, patent linkage is a disputed issue in India. One example of such a dispute is litigations brought by BMS for its drug Dasatinib and Bayer for its drug Sorafenib against Indian generic companies such as, Hetero and Cipla. Interestingly, one of the arguments made by the MNCs is that generic drugs are 'spurious' that is they imitate or represent themselves to be something they are not. These litigious moves by pharma companies obviously delay production of generics and make access to medicine more difficult (Rathod 2011).

In neo-medieval governance actors contradict themselves as profit incentives clash with humanitarian incentives. This causes problematic behavior. We now look at such behavior by states. For example, the society of states professes that through TRIPS welfare would be achieved. However, intra-state negotiations reveal that states often seek

⁴⁶ Such cheap costs are prevented when there is import of drugs. This is due to high production and transportation costs. Under conditions of import, artificial shortage can also be created which tends to drive up drug prices and reduce access to medicine.

to impose TRIPS-plus measures. The GOI has taken steps to actively prevent TRIPS-Plus measures being imposed by developed countries through trade deals. Such measures make drug availability more difficult. Yet, the very same first world countries that profess to help the developing countries insist on it. For example, the Indian government held strong on refusing to provide for data-exclusivity for 5-10 years in a trade deal with the EU. Such a deal according to Oxfam and Medicins Sans Frontieres would prevent Indian companies from producing extremely cheap ‘copycat’ versions of ARVs, even when patents on the drugs have expired. This would create for monopoly instead of competition that is needed to ensure better drug pricing (Bosley 2011). However, the Indian companies themselves are lobbying the GOI for stricter IPR including data exclusivity in order to become more competitive. By overcoming of regulatory environment uncertainty the companies hope to attract more investment. There is a possibility that the Indian parliament may pass such a law. And even if such law is not passed, in private business deals, stricter imposition of IPR may be negotiated between private entities (Rivera 2011). The lure of FDI thus ends up tightening the noose of IPR around the necks of the poor, whose diseases get neglected in such private deals.

The Indian government professes to help its poor people. But, recent steps taken by the GOI belies its proclamations of wanting to provide welfare to the poor. For example, in October, 2012, the GOI announced that it was going to alter the existing pricing system of essential medicines (www.indianexpress.com). It was going to expand the scope of Drugs Prices Control Order of 1995 by expanding it from 74 essential drugs to 348. Pharmaceutical companies are opposing the move, with Pfizer claiming that such

a move would push the sector into semi-recession. On the surface such a move seems pro-poor. But, the government is seeking to shift the pricing formula from the earlier 'production cost plus profit margin' to taking the average retail cost of a medicine sold by various leading manufacturers. Since selling prices by manufacturers is much higher than that procured by the government, prices are likely to escalate. This is especially true since the government intends to take the prices of the top brands instead of the cheapest brands. The Indian Supreme Court has been hearing public-interest litigation by the All India Drugs Action Network (AIDAN) and several other NGOs. AIDAN alleges that only around 78 drugs out of 370 are placed under the Drugs Prices Control Order of 1995, making rest of the medicines beyond the reach of common man. The Supreme Court, hence, has stepped in to prevent the government from altering pricing of essential drugs. It pointed out that the government accounts for poor by counting those earning a ridiculous amount of Rs. 32. In contrast to the below poverty line earnings, antibiotics cost Rs, 50-60. In order to gain access to such a medicine, the poor people would have to go hungry for 2 days (Mahapatra 2012).⁴⁷

Neo-medieval governance reveals the discord between the need to make profit, grow economically and the need to provide for access to health and medicine as a human right. Given this recognition, there is need to have better monitoring of corporate activities. Corporations need to risk some of their profit to ensure that they meet the

⁴⁷ Despite the GOI's current anti-poor steps, the GOI during the past decade has introduced fiscal and other methods to reduce the cost of drugs and ensure the availability of good-quality drugs at affordable prices. These include price control of essential drugs, standardized tax of 4% on drugs, and reduction in excise duty from 16% to 4%. The GOI is also opening Jan Aushadhi, a country-wide chain of medical stores to make generic and other drugs available at reasonable prices (Shiva Kumar et al. 2011). As is described in the section on health costs of the poor, the issue of access to drugs is nonetheless dire in India.

moral obligation of ensuring human right to life. There is also need for the society of states to undertake concerted actions to tackle the diseases of the poor. States need to actively collaborate with corporations as well as regulate them to ensure that their activities meet the universal human right to life.

Conclusion

For the most part, ever since TRIPS inception, the focus of domestic companies has shifted from serving the local market with necessary or essential drugs to expanding into developed markets. The main purpose of such a shift has been to take advantage of creating generic drugs of those branded drugs that are going off patent. Hence, there are hardly any drugs or vaccines of the poor available in the market to treat the poor in India. Vaccines are being made less available as seen from poor vaccination records and widespread disease under dire poverty conditions. Moreover, vaccines command a much smaller market than other drug products. This smaller market size of vaccines is due to the fact that vaccines are used at most several times in a lifetime whereas drugs are often used every day. The cost to develop and make many vaccines is much higher than that required to make most drugs. This high cost is due to the fact that regulatory agencies require higher standards of safety for products given to healthy people than those given to people who are sick. In the case of vaccines, pharmaceutical companies are required to disprove very rare adverse effects prior to being given licenses. This means enormous investment in clinical trials which most pharma companies are reluctant to do. Pharma companies are businesses and not public health agencies. Hence, they are not obligated to produce vaccines (content.healthaffairs.org). Given the non-public nature of private

companies, the expectation is that the government would intercede to control pricing and procure medicines for the poor. Since liberalization, India's record on both types of action has been poor. Thus, unleashing of a free market economy has not led to perfect allocation of factors of production and achievement of equity.

India's growth in the pharmaceutical and biotechnology sector has also been marked by brownfield investments of mergers and acquisitions. Instead of lowering prices of drugs and making essential drugs available, the shift has been towards rich people's diseases. There is increasing collaboration among Indian and foreign MNCs and it has created impressive growth in generation of innovation and production through contract research in bioinformatics, manufacturing of biogenerics and in clinical trials (Logfren and Benner 2010). But, such collaboration too is geared towards the problems of the developed world rather than that of the poor people of India. Even when the Indian government has been involved in funding research and drug development from Ayurveda, the lead or novel drug molecules are for developed country diseases. The GOI has funded research on NTDs but so far has failed to 'develop' drugs for the poor.

According to Jain (2011), the drive for patents for new discoveries means a likely rise in prices of any drugs and vaccines that are discovered. Also, biotech related drug-research through patents is hampered by the fact that ownership of genes by one party may discourage investment in research on the same gene by another party. Hence, problematic genetic disorders that severely affect Indian women such as anemia-related disorders like sickle cell anemia or thalassemia may either never get researched, or even if they are researched and a product is brought to the pipeline it may never really be

accessible to the poor. Non-accessibility may not be simply due to high price of the drug. It may also be because public and private labs may be unable to offer diagnostics tests due to costly license or royalty fees (Jain 2011). A free market economy in the face of widespread poverty in India has not led to equity.

TRIPS has led to growth in the pharmaceutical and biotechnological sector in India. However, such growth in knowledge economy has not trickled-down in the form of substantive welfare for the poor as seen from the state of women's health. This lack of equity can be also be seen from the lack of access to medicines and high healthcare cost burden of the poor. Despite the poor state of health in India, the GOI refuses to invoke compulsory licensing clause legitimized by TRIPS. This is because in reality invoking compulsory license tends to provoke retaliatory actions including market withdrawal by the patent-holding producer; informal pressure from foreign trade ministries to honor IPR or else face the threat of withdrawal of FDI; or even formal action via the WTO (Beall and Kuhn 2012). Overall, neo-medieval governance has left serious gaps in addressing human right of access to health and the right to life.

Appendix

In neo-medieval governance public and private entities have responsibilities for ensuring the human right to life. But, according to international human rights law, the primary responsibility of providing access to health lies with the state. But, under neoliberal dictates the state has been withdrawing from the public sector. In India, the state of public healthcare is dismal. Along with low access to medicines due to patent barriers, poor people suffer from lack of access to good healthcare infrastructure. This

comes at a time when the poor is burdened with the double whammy of communicable diseases (CDs) and NCDs.

According to Majumdar (2006), India is going through an epidemiological transition. According to Nugent et al. (2011), generally epidemiological transitions in terms of disease patterns, shifts from infectious to chronic conditions as a country becomes 'more developed.' But, in many of the poorest nations, the epidemiological shift to NCD as the major cause of morbidity and mortality is increasingly becoming common despite low overall indicators of development. 60% of the 58 million deaths in 2005 were attributed to NCDs with 4 out of 5 deaths occurring in low and middle-income countries (LMIC).

According to Nikolic et al. (2011), in 2008, 78% of NCD deaths occurred in LMICs and South Asia accounted for 53% of death between the ages of 15-59. By 2030, such deaths in South Asia are projected to increase for 72% of the population of all ages. In 2008, in low-income countries NCDs contributed to 37% of the loss of DALYs and by 2030 it is projected to increase to 55%. In theory, eliminating NCDs could have increased India's 2004 GDP by 4-10%. The four greatest NCD 'culprits' that contribute to loss of DALYs and GDP are cardiovascular disease (CVD), cancer, chronic respiratory diseases and diabetes. When associated with co-morbidities such as digestive diseases, mental health disorders, and musculoskeletal conditions, the four culprits cause premature mortality.

According to Nugent et al. (2011), international donors are an important source of healthcare in low-income countries. But, given the high priority of CDs, like HIV/AIDS,

donors have completely neglected NCDs. In 2007, of donor assistance of US\$ 21.7 billion, NCDs received less than 3%. However there has been some progress on this front. Global donor funding for CVD and other NCDs increased in real terms from US\$ 236 million in 2004 to over 750 million in 2008. The largest proportional increase in donor funding came from the private sector, mostly non-profit. This sector collectively contributed over US\$ 267 million in 2008, a 2000% increase from 2004. NCD funding from multilateral organizations increased from US\$ 175 million to 350 million between the periods of 2004-08. Funding contributions from research institutions, public health organizations, and disease membership associations made up less than 3% of NCD funding during the period 2004-08. But, such funding still fails to make a dent in the dire health situation in India. In reality, most of the funding comes from individuals' private savings.

According to Nugent et al. (2011), NCDs have high economic and social costs. Between the periods 1995-96 and 2004, the share of household's OOP expenditure on NCDs was found to have increased from 32% to 47%. About 45% of this expenditure went to medicines. Given that the costs of hospitalization tend to be very large relative to individual income levels, such costs tend to become 'catastrophic' expenditures. For example, in a public healthcare system, the cost of a single hospital stay for cancer or CVD is between 40-50% of per capita annual income. In comparison in the private sector, the cost is 80-90%. Since in India, approximately 40% of NCD is financed by OOP expenditure, the financial vulnerability of any quintile of the poor become catastrophic. Moreover, such costs have a gender dimension. When the male household

member suffers from CVD, 25% of Indian families experience catastrophic expenditures and 10% are driven into poverty as a result. In the case of cancer, 44% of households experience catastrophic spending and 24% are impoverished as a result. Beyond high medical costs and loss of assets and rising poverty, there is high cost of loss of human capital. Particularly, a country like India faces loss of ‘demographic dividend’ that comes from a high pool of young population.

According to Grimard (2011), poverty acts as a critical barrier to access to healthcare. Based on NSS 2004 data, the author reports that 28% of rural respondents and 20% of urban respondents gave financial restraints as a reason for untreated morbidity. In general, untreated morbidity was found to be at 18% and 11% in rural and urban areas respectively. In India, NCD drugs are also very expensive (very likely due to patents). For example, the estimated cost of basic inhalers represents 1.6 to 2.3 days of wages for the lowest paid government employee. Essential asthma medicines are thus unaffordable to the majority of the population who works in the informal and agricultural sectors.

According to Grimard (2011), NCDs are associated more with inpatient-care or episodes of hospitalization, especially due to complications from co-morbidities and acute surgical interventions, and longer stays that increase financial burden and can lead to catastrophic financial burden. Catastrophic burden occur when families have to spend equal to or more than 40% of household income after meeting subsistence. Such burden results in a ‘medical poverty trap.’

Given the burden of medical care, when there is demand, the poor increasingly turn towards the public sector for help. As they do so, the quality of health care would

mean regular follow-ups and treatments by professionals. However, in India, there are several major problems associated with accessing healthcare for NCDs. Rural, primary and even secondary centers in towns and cities are not really equipped or capable of handling NCDs. Overall, there is a major scarcity and unequal distribution of facilities equipped for this type of care. Specialized public centers geared towards treatment of NCDs are few. There is more predominance of private centers of healthcare for NCDs. Both public and private centers tend to be located in important urban centers. This typically means that mostly the affluent can afford them. But, more problematically, in case of acute emergencies, access to these centers becomes bogged down due to infrastructural problems. For example, most cities do not have an integrated ambulance and emergency service. Individuals end up using various modes of transportations, such as cycle rickshaws, taxis, and so on, that causes delays in interventions. When gender discrimination, such as prohibition on the ability to travel alone is added to this mix, the situation becomes grim for poor women (Grimard 2011).

Beyond hospital shortage for treatment of NCDs, there is also a shortage of labs and standardization of lab techniques for detection of diseases. There are also fewer professionals available who have the clinical capacity to detect symptoms and manage NCDs using appropriate guidelines and provide patients with self-management education. By the end of the 1990s, compared to 0.7 to 1.8 physicians per 1000 population in other LMICs, India had 0.2 physicians per 1000 population. Added to this issue is the fact that there is 17% shortfall in nurses and midwives, 28% shortfall in doctors and 47% shortfall

in male multipurpose workers, even when there are vacant positions in the public health facilities.

The scenario of infrastructural shortage is dire in rural areas. The ratio of beds in rural areas is 15 times lower than urban areas. Primary Health Care centers are functioning with only 38% of essential manpower and 31% of essential supplies. In the absence of infrastructural capacities, poor patients in general, but particularly asymptomatic patients have negative to low motivations for maintaining their prescribed treatment regime; ensuring regular follow-ups; and following appropriate behavioral precautions or amending extant behavior. Hence, it is not surprising that 20% of poorest in India have twice the mortality and morbidity rate of the regular population (Grimard 2011).

According to Welshoff (2006), India has a huge health system; is severely cash-strapped; has underdeveloped training centers and few institutions for training local rural staff; has severe shortage of available doctors and medical institutions to train them; and a lack of willingness of doctors to locate to rural areas for service. According to Rao et al. (2011), according to government estimates, 18% of local Primary Health Care centers (PHC) are without a doctor, about 38% are without a laboratory technician and 16% are without a pharmacist. 52% of sanctioned posts for specialized allopath doctors at community health centers (CHC) are vacant. 18% of posts for nurses at PHCs and CHCs are vacant. The number of female doctors per 10,000 people is also very low in India. Only 17% of all allopathic doctors and 6% of allopathic doctors in rural areas are women. The number of female allopathic doctors is only 0.5 per 10,000 people in rural areas.

Overall, India has roughly 0.6 nurses per doctor. The number of allopathic doctors per 10,000 people is more than three times larger in urban areas (13.3) than in rural areas (3.9). For every 10,000 people even Indian System of Medicine practitioners is more in urban (3.6) than in rural areas (1.0). The poor's first contact typically is informal or what are called 'registered' medical practitioners who do not have professional qualification or license to practice any medical discipline. These practitioners tend to be traditional healers.

According to Grimard (2011), currently in India, only 20% of all health services are offered in the public sector. It is estimated that about 24% of the population will either not use health services or systematically fall into impoverishment when they do. According to NSS 2004 data, 39.8% rural women used private outpatient rural services and 11.8% used public outpatient rural services. In contrast, 24.7% rural women used inpatient private services and 19.3% used public inpatient services. Thus inpatient service was used more in the public sector than outpatient services. According to NSS 2006 report, the poor tend to use the public sector more for inpatient care and use unqualified private practitioners for outpatient care. The same report also points out that 12% of rural residents said that they did not seek care for minor ailments because there were no medical facilities available in their community. People have to go to urban settings to get access to treatment for major ailments.

According to Grimard (2011), public sector health is often theoretically free in India. In reality, often direct and indirect costs tend to arise from multiple sources. For example, indirect costs arise from purchase of drugs due to organizational unavailability

of medicinal supplies. When the poor have to resort to buying it from the private sector, they have to pay higher costs. Direct costs arise out of transportation to medical facilities. There are also indirect opportunity costs, such as losses in productivity or income due to taking care of a family member. The authors report a study that examined the costs of health services and illness in five resource-poor settings in India. In this study, on average, 73% of a household's monthly income was spent on illness with hospitalization being costlier and drugs constituting the greater share of total costs. The ratio of direct to indirect costs of healthcare turned out to be 67:30.

According to Husain et al. (2008), structural adjustment programs imposed on India after its early 90s balance of payments debacle focuses on provisioning public goods and services that have significant externalities in a cost-effective manner. This focus on efficiency has two problems when applied to the health sector. First, it does not directly address the issue of equity. Second, it has sparked off a wide range of reforms such as charging of user fees and the formation of joint-ventures of public-private investments. Such changes have failed to deliver on the promised potential of the private sector. The potential benefits of the private sector include providing an efficient alternative to the perceived bureaucratic and corrupt problems of the public sector; greater competition and restricting the scope of monopoly profits so that consumers would have a broader menu of health choices; all of which matter in terms of equity. This change and failure to provide equity, particularly in light of the shift from government being a substantial provider of health to a mere regulator and guarantor has become highly problematic.

Husain et al. (2008) gives an example of public-private partnership to see if such a venture has helped the poor. They look at the AMRI hospital in Kolkata. The objective of setting up AMRI was to offer quality treatment at a reasonable cost to the community at large through the creation of a super-specialty institution. AMRI's official mission claims that it is dedicated to helping the underprivileged in Kolkata. AMRI does have special packages for the poor, but the authors point out that the access of the poor to this institution appears to be restricted to very few people, essentially voiding the purpose for which the institutions was set up. The profile of patients as indicated by the authors' study revealed that the benefits of the public-private initiative flowed almost exclusively to the middle and high income sections of the community. Moreover, poor patients who came to AMRI, a referral institution, came directly. This was because of the inadequacy of sub-level institutions to provide for adequate and appropriate treatments.

Against the backdrop of poor infrastructure and OOP expenditure, it is critical to note that while WHO recommends spending 5% of GDP on public health care, India spends only 0.9%. Hence, it is critical to look at the NCD profile of India to gain an understanding of how dire the health situation is in India. India faces a double burden of CDs and NCDs. This increases the socio-economic costs of the poor even more.

According to Ebrahim and Smeeth (2005), approximately half of the world's poorest 20% of people live in India. For these people CDs remain the key priority area of target. But, due to the role of impaired early growth due to fetal and infant under-nutrition, adult obesity, hypertension, diabetes and CVD remain significant problems.

According to Beaglehole et al. (2011), LMICs account for four-fifth of NCD deaths and a third of such deaths are in people younger than 60 years. NCDs disproportionately affect poor who cannot access comprehensive services for prevention and treatment of chronic NCDs because of financial reasons and weak health system. Poor people also live in settings where policies, legislations, and regulations to tackle NCDs do not exist or are inadequate. For example tobacco smoking or chewing is a major problem among the poor. Tobacco leads to cancers like lung and oral cancer. But, this prevalence among the poor is due to the tobacco industry's uncontrolled activities and non-stop efforts to influence and weaken tobacco control policies. Trade and capital market liberalization have contributed to reduced prices and increased availability of unhealthy products like tobacco, alcohol and salty processed food that is leading to rapid rise in NCDs like cancer and obesity. The poor also live in polluted and degraded environments that contribute to and exacerbate the problems of NCDs. They also fail to get access to off patent drugs that can be manufactured at affordable prices. Many of the cancers that arise from unhealthy lifestyle such as liver cancer can be largely preventable through administration of Hepatitis B vaccine. But, the large cost and challenge of delivery are drawbacks to such curative measures.

According to Rahman and Singh (2011) in 2004, in India, deaths due to NCDs were twice that from CDs. During 2008-10 India was expected to bear 60% of the world's heart disease burden. Cancers accounted for 3.3% of the disease burden and about 9% of all deaths. The number of people living with cancers is estimated to rise by nearly one-quarter from 2001 to 2016. Moreover, at least 6.5% of the Indian population

has some form of serious mental disorder with no discernible rural-urban differences and no differences among women from across different classes. Moreover, in 2000 an estimated 41.5 million people were suffering from hypertension. This burden was projected to increase by another 5 million by the year 2025.

According to Rahman and Singh (2011), the inequalities in society are significantly to the disadvantage of the poor in case of cancer and mental illness. In the sampled population in their study, the presence of risk factors was found to be disproportionately concentrated among the poorer quintiles than among the richer quintiles. For example, 19% of the poor compared to 10% of the rich smoked; 23% of the poor as compared to 10% of the rich chewed tobacco; 10% of the poor as compared to 5% of the rich consumed alcohol; and 60% of the poor as compared to 46% of the rich had to live in an overcrowded situation.

According to the World Bank, NCDs now account for over half of the disease burden in India. Ischemic heart disease (IHD) is the leading cause of both deaths and foregone DALYs in working age adults (15-69 years) [Engelagu 2011]. According to Khor (2008), in 2002 age-standardized death rates per 100,000 for IHD was 268 for men and 198 for women. Poor people who face long major illnesses after major heart attacks have to pay for most of their care out of their savings or sell their possessions. They are then caught in a poverty trap as they can't get well and hence, cannot work. Chronic energy deficiency in adults due to malnutrition further adds to this burden.

For every 10% rise in mortality from NCDs, the yearly economic growth is estimated to be reduced by 0.5% (Beaglehole et al. 2011). And yet, the public

expenditure on NCDs is minimal. According to Nugent et al. (2011), compared to developed country expenditure of 2.5-25% of their health budget on diabetes, developing country, like India, which has a high prevalence of diabetes are expected to spend 40% of their budget which was between US\$ 232-421 billion. But, this does not happen. Despite the threat to economic growth, LMICs public health care system receive only 0.08-4% of GDP for addressing NCDs.

India is considered to be the diabetic capital of the world. Diabetes mellitus creates for complications including blindness renal diseases and amputations. According to Beaglehole et al. (2011), long-term affordability of insulin however, remains dubious for the poor due to patent barriers and lack of access to affordable drugs. According to Nugent et al. (2011) and Khor (2008) currently, India has the highest worldwide incidence of diabetes and hypertension and this puts 25-40% of its population at risk. The rapid surge in diabetes and hypertension has contributed to the rising epidemic of chronic kidney disease. According to Hossain et al. (2009) diabetic nephropathy is expected to develop in 6.6 million of the 30 million diabetic patients in India. Moreover, at least 49% of India's population is unaware of hypertension.

According to Awasthi and Mishra (2007), out of the 75% of the total diabetic persons living in developing countries, India will have a large majority, approximately 220 million. By 2025, diabetic population in India will be equal to diabetics from all over the world. At present, India has approximately 20 million identified diabetic patients and an equal number of undiagnosed diabetic patients. India represents one of the high women mortality countries. Poor, marginalized and rural women tend to be more

vulnerable to health problems. Neglect of women health plays a crucial role in high mortality and poor development of the girl child. This has long-term consequences for women.

According to Lahiri et al. (2011), while CDs currently contribute to 47% of mortality, NCDs contribute 44%. In diabetes, with a head count of 40.9 million, currently India leads the global top ten countries in terms of the highest number of people with diabetes. Currently, every fifth patient visiting a consulting physician and every seventh patient visiting a family physician is diabetic. The affected population is expected to increase to 69.9 million by 2025. Hence, the WHO has labelled India the diabetic capital of the world. In their study, they found women, house-wives and rural people to have very poor knowledge of diabetes.

According to Mitra et al. (2009), the prevalence of diabetes will increase by 195% in 2025 and the majority of the sufferers will be young. According to the authors, diabetes arises out of environmental and lifestyle changes that result from industrialization and westernization of diet habits and migration to urban environment from rural settings. The disease is affecting both urban and rural population at an alarming rate. What is interesting about the diabetes scenario in India is that while most people get diabetes if their BMI index is 30-31, in the case of Indians, a BMI index above 25 is enough for them to contract the disease. In the authors' study, only 5% people know that sedentary lifestyle is a risk factor for diabetes.

Mitra et al. (2009), points out that there is possibility of genetic susceptibility to diabetes that may have been passed down over millennia to races of all different kinds in

India. India's past prosperity may be a reason for this rich people's disease being currently endemic in India. This can be seen from several cases. For example, in some extremely poor populations in India, such as the poor tribal belts of Rajasthan and Gujarat, diabetes was found to be highly prevalent despite the very low consumption of protein and existence of an alternate starvation-excess cycle. Similarly, in a multi-center study, diabetes was found to be more prevalent among vegetarians (2.1-2.8%) than in non-vegetarians (<2%). Also, a study found that Asian Indians living in the USA and maintaining traditional Indian dietary habits using cooking oil mediums devoid of trans-fatty acids still have higher insulin levels, higher plasma glucose levels and lower insulin binding to erythrocytes after a glucose load compared to Caucasian Americans. The Asian Indian population is at a higher risk of developing Type 2 diabetes.

According to Mitra et al. (2009), the per capita income of an Indian has been estimated to be Rs. 15,000 per year. At the same time the estimated median annual direct medical cost for patients with Type 2 diabetes without complications is Rs. 14, 507. Hence, the cost of treatment of diabetes, enhance if there are complications, can ruin families, not just the poorest, but also the middle-class.

Obesity is a growing problem in India and a cause of diabetes. The rationality for poor women becoming overweight has not been clearly elucidated in the literature. But, some authors offer clues. For example, Khor (2008), points out that obesity is rising due to dependency on cheaper sources of energy-dense foods such as cereals and starchy root crops/tubers, preference for convenient sweet and oily snacks, increased sedentariness, and the difficulty of shedding off excess body fat accumulated when births are closely

spaced. Poor people then also become burdened with CVD and cerebrovascular disease. In 2002, age standardized deaths per 100,000 for cerebrovascular disease was 126 for men and 117 for women.

According to Gaihaa et al. (2010), between 1993 and 2004 there was a 31% rise in the use of Vanaspati-oil in rural areas. This oil is full of trans-fatty acids and calorie-intake from food cooked in this oil significantly contributed to obesity. Moreover, compared to 32% of non-poor households, 14.5% of the poor ate out. About two-thirds of the households that ate out were rural. The main reason was the availability of low-cost fatty foods, especially on migration routes. Hence, compared to 14.18% of overweight from economically well-off households, adults from economically deprived households were likely to be overweight by 7%. Compared to 3.75% obesity among the economically non-deprived, a disproportionate 1.25% of the economically deprived was likely to be obese. Overall, rural areas accounted for 9% of obesity.

Increasing problems of overweight and obesity typically portends higher risk of chronic NCDs. Gaihaa et al. (2010) points out that in 2005, NCDs accounted for 53% of all deaths and 44% of DALYs. More critically, many of the deaths occurred at early ages. Due to CVD, in 2000, in the age-group of 35-64, 9.2 million of DALYs were lost. This was the highest in the world. By 2030, this DALY loss is expected to touch 17.9 million years. This loss can be counteracted by increased promotion of breast-feeding, improving the nutritional status of women of reproductive age, and reducing fetal growth retardation.

According to Gaihaa et al. (2010), between the periods of 1980-2008, life expectancy in India rose from 54-69 years. According to Grimard (2011), the percentage of elderly population in India is rising. During the period of 1991-2001 there was 38% increase in the 60+ age group. By 2019 this group is projected to outnumber the 0-14 years old in the country. The elderly population is one of the most vulnerable and economically dependent groups in India; as much as 40% of them are BPL. As people become old, NCDs and multiple morbidities increase. For example, a high proportion of CVD events and deaths in India occur before the age of 70. Similarly, the prevalence of musculoskeletal pain and joint problems in rural areas is 14.1% compared to 19.5% in urban areas.

According to Grimard (2011), diseases such as diabetes, CVD and mental disorders now comprise 53% of all deaths and 44% of DALYA. In a multi-centric study diabetes prevalence was estimated to be at 3.1% in rural areas, the prevalence of CVD was 3-4% in rural areas. In 2005, at 29%, CVD was among the leading causes of all deaths. Per 100,000 populations psychiatric morbidities are affecting 58.2 individuals. The increasing prevalence of chronic physical diseases also contributes to the increase in some mental disorders as co-morbidities and vice versa. The risk of depression rises when disabilities arise as people become psychologically burdened by a future of unaffordable costs along with the inability to work in a resource-poor, knowledge-poor, and limited choice environment. Currently, depression accounts for 9.11% of morbidities in India. However, perceived stigma and lack of awareness of mental disorders affect the utilization of mental health services in India. For example, a study conducted in rural

Maharashtra highlights the fact that even when disorders are recognized, they are often not considered by the study participants as 'real illnesses.' Many families tend to seek care through traditional healers for mental problems. Formal treatment in psychiatric wards and mental hospitals through qualified psychiatrists tend to be discouraged by families, village doctors and community interventions. The cause of such problems tend to originate from the explanation people have for these diseases, their difficulty in distinguishing traditional medicines from religious healers, and the accessibility of psychiatric care, especially in rural areas. Hence, morbidity is on the rise. For example, in West Bengal, the prevalence of depression increased from 49.93 per 1000 population in 1972 to 73.97 per 1000 population in 1992.

According to Sarkar et al. (2011), a major NCD that affects Indian women irrespective of class is gynecological malignancy (GYM). There are increasingly more cases among young women in India. The most common types of GYM are cervical, ovarian and endometrial/uterine cancer. Other less common GYM are cancers of the vagina and vulva. GYM also includes gestational trophoblastic neoplasia, in which tissues are formed in the uterus following conception and become cancerous. In India, cervical carcinoma is the most prevalent form of cancer. India's cervical cancer age-standardized incidence rate (30.7 per 100,000) and age standardized mortality rate (17.4 per 100,000) are the highest in South-Central Asia. Ovarian cancer has the highest fatality-to-case ratio of all the GYMs. Uterine and vaginal cancer usually affects elderly women. However, poor knowledge and health-seeking behavior of the patients raises the mortality rate of cancer significantly. Cancer Registries in different parts of India reveal

that the majority of cancer cases are presented for treatment in an advanced state when the likelihood of cure is considerably reduced and treatment options become prolonged and expensive. This fact occurs partially because the practice of regular health check-ups is not a routine practice in India.

According to Ebrahim and Smeeth (2005), liver, cervix, and stomach cancer are caused by infectious diseases. According to Chhabra et al. (2010), India contributes to 20-30% of the global burden of cervical cancer. This cancer most often develops in women in their 50s or 60s for etiological reasons such as health consequences of living conditions, poverty, poor nutrition, frequent births, age at first intercourse, early marriage, sexual promiscuity (which could also be interpreted as a result of violence due to human trafficking).

Overall, according to Grimard (2011), in India, access to healthcare is not recognized as a right in the constitution. Social protection is based on the concept of essential needs and not on human rights and social justice. Nonetheless, the GOI has started taking steps to tackle NCDs, but they are rudimentary and in a fledgling state. This is apparent from the fact that the reformulated National Health Policy of 2002 (the first one being enacted in 1983) had very little focus on NCDs. The programs that already existed were the National Mental Health Program and the National Cancer Control Program from the 1980s. Newer initiatives include Tobacco Control Act and a pilot version of the National Program on the Prevention and Control of Diabetes, Cardiovascular Diseases and Stroke. The latter program was started by the Center for Chronic Disease Control in 2007 as part of central government initiative. However, it is

being run in a few select states and Bengal and Maharashtra are not part of it. The NRHM is also focusing on up-scaling of services to tackle NCDs. The NRHM has a gender-sensitive component in that it aims to establish staffing norms for female doctors in Primary Health Care centers and more programs for women's health. Such programs are constitutionally supposed to be divided between the center and the sub-states and are expected to be promoted in a decentralized manner. But, in reality, in terms of program formulation and fiscal decentralization, the central government still has the maximum say. Thus, top-down policies predominate in service delivery.

CHAPTER FOUR: TRADITIONAL AND MODERN KNOWLEDGE OF SEEDS IN AGRICULTURE

Introduction

This chapter explores the growing patent regime around ‘natural’ goods like seeds. To understand this issue the chapter first explores the meaning of women’s right to land, seeds, and seeds-technology within a patriarchal environment. The chapter points out that women are highly discriminated in all three issues. Knowledge economy cannot account for social identities that distorts market functions and prevents women from achieving welfare. Second, the chapter explores the neo-medieval governance of seeds looking at issues of legal regimes and civil-society pushback against claims that seeds can be patented and that huge industrialization of biology through biotechnology is beneficial for societal development (Wellstead 2011). Knowledge economy cannot predict such civil society pushback. Third, the chapter explores the issue of women, land and welfare through the lens of knowledge economy embedded in neo-medieval governance. It explores growth or its lack of in agriculture, increasing feminization of

agriculture and the way land is an integral part of women's welfare, particularly welfare of food security. It points out how knowledge economy has failed to transfer a huge portion of the population from subsistence level physical activities to higher activities of intellectual work or services. Fourth, the chapter explores the case of growth and malnutrition in Maharashtra. Maharashtra has been the scene of high growth, cotton-farmer suicides and rising poverty. It makes for an interesting example of how contra knowledge economy prediction, growth through seed patenting has not translated into welfare, particularly through ensuring food security.

Women, Land, Seeds and Technology

Hapke (2013), points out that:

patriarchal structures and relations encompass the economy (relations of production/reproduction; property rights; access to resources), the state (political-legal institutions), sexuality (unequal relations that constrain women's sexual freedom and orient them towards marriage as a means of control), culture/ideology (multiple discourses on femininity and masculinity), and the household/family (marriage-kin and residential systems, patterned behavior between intimates)' [Hapke 2013:14.]

Unfortunately, knowledge economy does not take into account this structural factor that prevents women from realizing welfare within a modern knowledge economy. This section explores the role of patriarchy in women's access to land, seeds and seed-technology.

To understand the depth of patriarchy and women's subordination it is useful to peruse the following example. On July 2012 a village panchayat in Uttar Pradesh declared that women could not use cell phones, had to cover their heads in public and

outlawed 'love marriages' or marriages made by choice rather than being arranged by family elders (Sandler and Rao 2012). Cell phones are a modern means of maintaining women's social network. Furthermore, for a women farmer it is a medium for garnering information about the market and avoid being squeezed by intermediaries. To lose cell phone access in today's world is a serious curtailment of women's freedom.

Women's freedom is also curtailed in other ways. In India, there is a growing trend towards 'honor' killing of couples who have dared to marry for love. This entrenches patriarchy even more as women's 'body' is controlled by her male relatives who get to define where the 'body' will go to after leaving natal home. Thus there is a growing 'culture of silence' surrounding women who are forced to follow the decisions of their male relatives even if it negatively affects them. Such discrimination and oppression arises because compared to boys, girls are highly under-valued in India. Hence, it is not surprising that India has a highly skewed sex-ratio. According to the 2011 census, India had 940 females per 1000 males and the female sex ratio was 944 girl children per 1000 boy children. Women are forced to abort girl-children and female infanticide is high in India.

When women have hardly any choice over their body, it is no surprise that many times they hardly have control over assets like land and seeds. Even if women owned land and seeds, economic independence through ownership of land is no guarantee for women being protected against discrimination. Economic independence can fail to curtail social and/or physical violence against women. It is against this background that

women's access to and control over land, seeds and seeds-technology needs to be understood.

Land

Women's lack of control over land is a complex issue. This is illustrated by a field-study done by Gouthami and Rajgor (2008) about women's land ownership in salt wastelands of Kutch in Gujarat. The Hindu Succession Act of 2005 has provided women with inheritance right to land. As the history of land redistribution is overall poor in India, one may think that such laws increase women's de facto control over land. However, the category of women farmers, particularly small and marginal women farmers with land is highly fuzzy in terms of de facto control. The fuzzy character of women's land ownership is revealed in Gouthami and Rajgor's (2008) study. The Gujarat government had undertaken resolution to grant wastelands to landless people. With the help of NGOs, women had started applying for such land. The authors interview women from different communities and find that women's self-conception of land and their understanding of how others' view their land ownership is varied. When interviewed, women from six different communities gave different answers about how and why land is important. Five of these answers are relevant here.

In group one's interview, Gouthami and Rajgor (2008) point out that all the applications that were approved in only women's name were cases where the women were widowed. There appeared to the authors to be a clear bias against women who applied for land in their names while living with their spouses. Women in this group did not care about the principle of land ownership in their own right. They felt that official

paperwork was a hassle and they would have equal rights to the land even if it were just in their spouses' names. This group of women felt that having land in a woman's name did not make a difference because any decisions regarding the land, such as, what crops to sow, where to sell the produce where to buy the inputs, and so on, were all made by male relatives. The women would wait for a male relative to give them advice before they would take any action regarding land, even though all the actions would be done by them. This subservience held particularly true for wives of migrant workers to the Gulf region. The women felt that community as a whole and men of the community would look after widows and wives of migrant workers, and they would not lose out in the process.

In the second group, rich women had land registered under their names for two reasons. First, the men would buy the land with profits made from other businesses to avoid paying tax. Second, men could take loans and in case of default, land would not be taken away as it was not in their name. Women felt that there was no need to own land for security reasons as the community would take care of women whose husbands threw them out and take care of widowed women. Through discussion the women realized that land has practical economic use as well as being an asset which could be sold in times of crisis. Hence, they agreed to identifying and signing up land grant petition for widowed and destitute women in their village.

In the third group, women strongly felt that land was a worthwhile asset. Since Kutch, in Gujarat faced drought in three out of five years, even two years of good harvest would make a big difference in feeding their families over the entire five-year period. Here women wanted and had obtained land for themselves. They were however, reluctant

to give that land to their daughters. Since daughters would be married outside the village, they would not be able to till or look after the land in any way. Moreover, land, a highly symbolic means of sustaining life, given as dowry in marriage would be an insult to the in-laws who would construe it as a sign that they could not sustain the daughter on their own. The women understood that land provided income in the long-run and hence, they were willing to give it to their daughter-in-law. To compensate their daughters they were willing to give them gold jewelry equal in value to the land. However, women generally do not have the right to dispose off such jewelry to acquire money to spend according to their own desires. So, in the end, gold jewelry is not a helpful asset for women.

In the fourth group, women were happy to own land jointly with their spouses. This way they were guaranteed that land would come to them in the case of their husband's death. In this group, the tradition of community looking after women so that women did not have to earn a livelihood was strong, but nonetheless, the women wanted land in their name for security, particularly in old age.

In the sixth group, women stated that men cannot be trusted and therefore women must own land in their own name to survive in this world. There were women in the group who had given a share of their land to their daughters. There were women who sold the produce in the village market by themselves, kept their income and decided on how to use it. They felt that independent ownership increased respect for women and provided for security.

The above-mentioned interviews reveal that there are multiple possibilities of women and land ownership. Women may own land, they may till the land and provide all

the labor, but, they still may not have de facto control over their land. Husbands may take the produce to the market and pocket all the income and then dole it out in the household according to his wishes (Porter and Phillips-Howard 1997).

Even when women provide all the labor, women may deny owning land and project themselves as housewives or homemakers for reasons of social status or social norm. This leads to lack of recognition of women's unpaid work. Even when women own land, they lack direct access to productive resources such as farm inputs and agricultural services because of lack of recognition of land as their own. They also cannot decide how income from land is spent. Most critically, they cannot participate in decisions regarding the sale of land or transfer of control or ownership of land to other family members. In India, this happens even in Kerala where gender indicators of development such as education, is highest in the country (Arun 2010). When wealth of a household increases, say from remittances from male migrants to the Gulf, as happens in Kerala, women's agricultural work is no longer needed to survive and women are withdrawn from remunerative work. This withdrawal of women from the labor market acts as a marker of social status and forces lower income households to emulate. This increasing trend towards 'housewifization' shows how women's freedom and mobility is curtailed in a patriarchal world (Hapke 2013). Even widows are not de jure female-headed households; their activities are often subject to the wishes of other male relatives.

Let's now explore women's tenancy security in land. According to Tandon (2010), in the wake of 2008 economic crisis and increased food prices and shrinking availability, there has been increased pace of acquiring land rights. Private and

institutional investors, particularly from the developed world are seeking to diversify their asset bases including outright buying or long-term leasing of agricultural lands in developing countries.⁴⁸ Such ownership has meant that while farmers may still live on land, they may no longer have a say in what is grown or for whom. Under such circumstances women's right to grow food and source it is threatened and food insecurity increases. Thus, women slowly lose the right to farm food crops as lands are dedicated to cash crops. This adversely affects knowledge-stores of seeds of food crops.

Knowledge economy assumes perfect allocation of factors among market actors. This vision fails to see market distortions from issues of neo-medieval governance that arises from authorities of patriarchy. Knowledge economy visualizes initial equitable distribution of resources among market actors. But, patriarchal discrimination and poverty means that women do not have equitable access to land, seeds and seed technology.

Seed

Knowledge economy provides for individual property rights in intellectual property. Such rights are tangible and codifiable as patents. Certain intellectual property rights however, are in non-codified form as they reside in generations of passed down oral traditions that are found in social networks. Such knowledge is sticky in transmission, which means it is not easily codifiable. Traditional knowledge of women

⁴⁸ Beyond profit motive there are also altruistic reasons for such land leases or buying of land. For example, the Alliance for Green Revolution in Africa, a partnership between the Gates and Rockefeller Foundation which is working with Monsanto is trying to bring an Asian-type Green Revolution to the African continent to ensure food security. Biotechnology and GM crops are thus an integral part of such efforts and so is corporate control over seeds. Thus, even in altruistic cases land ownership by transnational corporations is problematic.

about seeds is such form of knowledge. Such knowledge is actualized through planting of seeds on land and monitoring of various environmental factors to save, select, and re-use the best possible kinds of seeds. Given that land is the basis of actualization of knowledge of seeds, de facto control over land is critical for women. Knowledge economy do not take into account the gendered nature of society, where knowledge of seeds and the growth of such knowledge through cultivation in land are bound within patriarchal norms of 'communities'. In a patriarchal society, land is not easily given to women as property. Consequently, knowledge-holders cannot realize their 'individual' property rights over seeds and land. Moreover, women function within social networks and knowledge of seeds reside in such networks of women. Rural women are often illiterate and do not know the official channels and paperwork needed to file for an IPR. Hence, the possibility of women, particularly illiterate women, gaining individual IPR over seeds is a difficult prospect. Knowledge economy's vision of a patent driven market economy is thus empirically not feasible.

According to Chitnis (2011), seeds have long been a part of India's cultural heritage. In a country where about 70% of the population still lives in rural communities, seeds are an integral part of many rituals, ceremonies and festivals that celebrate the cycle of birth, life and death. The practice of seed saving has been a cornerstone of Indian farming traditions. But, much of this changed with India's Green Revolution in the 1960s. Introduction of the high yielding seed varieties and pervasive use of chemical fertilizers and pesticides eroded the diversity of indigenous seeds. As farmers moved away from the practice of saving and exchanging seeds with their neighbors and families,

to buying seeds from the market, their own indigenous knowledge systems about farming and seed saving slowly became eroded and irrelevant. As a result crop diversity suffered. In a land that once had 100,000 varieties of rice, one is now hard-pressed to find anything outside a few popular varieties in the market.

According to Chitnis (2011), traditionally, women farmers are primary seed keepers in the country. They are also significant food producers but they are not recognized as farmers due to patriarchal norms of discrimination and have to struggle for land, information and credit. The women's knowledge of seed saving, mixed farming and natural farming is vast. On top of that they have vast stores of knowledge about the medicinal properties of crops. The intimate knowledge that women have about natural resources around them is often devalued by the state and agro-scientists, who instead seek to promote technologies that may not always be appropriate for the poor in rural communities. For example, some greens found on the fields, which poor farmers subsist on during lean periods are often considered as weeds by agro-companies. When such information is passed to male farmers, through extension services, the men eliminate the weeds with herbicides, chemical fertilizers and pesticides. When such actions occur, knowledge of seeds of such greens disappear over time. Knowledge economy's prediction of knowledge sustainability and innovation thus turns out to be wrong.

According to Shrivastava (2006) women farmers of Karnataka, prefer to save seeds, rely on their traditional knowledge and avoid buying seeds from the market. To ensure food security, women in Karnataka are increasingly forming firm social networks across villages and crossing caste, class and religious lines to exchange seeds from seed

banks. Food crops are also critical in the face of rising inflation and food prices. Cultivating food crops is a crucial way of maintaining food security and avoiding malnutrition. This emphasis on food crops is becoming even more critical as cross-pollinator honeybees are disappearing due to monoculture of cash crops and plantations and widespread use of pesticides. When there is monoculture, bees are deprived of food that they derive from a biodiverse environment (Verma, 2010). Pesticide laced food sources also kill honeybees. Without cross-pollinators the delicate ecological balance based on diversity of crops is destroyed. A shift away from monoculture to diverse food crops is likely to stem such problems. However, under knowledge economy there is more emphasis on monocultures and cash crops. This has led to loss of biodiversity and food security.

According to Amri and Kimaro (2010):

nutrition and health needs are most often women's responsibility. Therefore, it is usually women who are knowledgeable about the diversity of crops and variety that serve these needs, their culinary nutritional or curative properties and their agronomic and environmental characteristics (Amri and Kimaro 2010: 368).

The authors studied Tanzanian rural women to understand their seed knowledge, but their study can be used as an analogy for India. According to the authors, women are more involved in production of seeds of subsistence crops such as beans, potatoes, finger millet and vegetables. Compared to women, men are concerned with production of seeds for cash crops. Both men and women produce maize crops because of its dual role as a household food and cash crop. Women also tend home gardens. In such gardens they

grow fruit trees, annual vegetables and spices for family use. The seasonal surplus is often sold in local markets.

According to Amri and Kimaro (2010), women separate seeds from the field for saving at home. They are taught to save seeds by elder women in the family such as mothers and mother-in-laws. They choose seeds of food crops based on multiple considerations such as cooking; meal quality; taste; resistance to pest and diseases damage; ease of collection, processing, preservation and storage; and having secondary qualities, such as, provision of straw for thatching, mat-making, fodder and husks for fuel. Hence, seed saving is typically seen as women's work. Women's exchange networks are vital in maintaining seed supply systems and trading crop genetic diversity. Men however, are more active in seed selection for cash crops and in saving seeds they have narrower considerations of yield suitability for a range of soil types and ease of storage.

According to Ravi et al. (2010), currently, although 7000 plant species are found useful in agriculture, only about 150 species are largely used and less than 30 plant species meet about 90% of the world's food requirement. On the food front, currently about 60% of calories and 50% protein are derived from only three major cereals, rice, wheat and maize. Such shrinking species content in the food basket is a matter of major concern for agro-biodiversity. This shrinkage has also resulted in the marginalization of a large group of locally important crops, appreciated by communities because of their adaptability to marginal farming conditions, relevance to local food culture, self-esteem and self-identity of cultivators, and diverse nutritional values and nutraceutical

advantages. Such orphan crops, such as, pseudo cereals like foxtail millet and finger millet are the domain of poor women and their neglect is leading to rapid loss of their competitiveness, genetic resources as well as the associated traditional knowledge on production, processing and utilization. In the drive for cash crops under the dictates of knowledge economy and the lack of provisions for preservation and cultivation of knowledge of poor women, agro-biodiversity is being lost.

Women's knowledge of seeds and food crops is being threatened by patriarchy and a market economy that enhances that patriarchy. Due to increasing feminization of agriculture women provide the labor needed to cultivate crops, but many times they do not have a say in what types of crops will be cultivated. Land is being increasingly controlled by men and so is the type of crop that is grown on that land. The growth of cash crops cultivated by men and women's marginalization from cultivating cash crops is making the women's situation ever more precarious. This is explored in the next section.

Seed-Technology

Knowledge economy assures growth and developmental welfare through free-market trade and IPR. Based on such a premise, the government grants IPR to foreign seed companies like Monsanto (patents being granted for a period of twenty years) and seeds become 'property' of such agribusiness companies. The seed is then openly traded on the market with profits accruing primarily to the monopoly holder. Though profit accrues to the monopoly holder, the idea is that provision of patents will provide welfare to farmer-producers in the long-run by giving farmers access to high technology seeds which they otherwise would not have gained.

Access to patent protected high technology seeds however, have not turned out to be a boon for many farmers. This is due to many reasons. Most critical factor is the monopoly pricing structure of seeds. Monopoly position of Monsanto means that the price of Bt cotton seeds are very high. The justification for such high prices is that the company needs to recoup its research and development costs. Under monopoly conditions, such seed patent property however, can have deleterious effects on crop sustainability and farmers' welfare as seen in spikes in suicide rates of farmers due to indebtedness. To procure high priced seeds, farmers often have to become indebted to private moneylenders who charge very high interest rates. When the government tried to intervene in the seed market and control price there arose a flourishing black market of seeds. The black market of seeds also have very high prices. On top of that many of seeds on the black market are spurious and are a certain recipe for crop failure (Nemana 2012).

Monopoly price from patents along with multiple other factors, cause indebtedness of farmers. First, once the farmers harvest their crops they find that they are faced with low price of cotton crops. This is because of non-competitiveness of cotton crops in the face of developed country subsidies to farmers. Such subsidies act as trade barriers and goes against the notion of free trade. Such subsidies means that the return on investment becomes lower than expected and farmers are burdened with high initial costs

that they cannot recoup.⁴⁹ Knowledge economy cannot account for the power of states that lead to market distortions through trade barriers.

Second, the lack of cheap credit from institutional lenders, like banks forces farmers to borrow from private sources which charge high interest. This over time leads to high indebtedness which in turn leads to loss of land and landlessness. By 1999-2000 the proportion of landless rural dwellers had reached 41% while that of marginal and landless combined rose to 63% (Walker 2009). Knowledge economy cannot account for such institutional failure of credit and consequent poverty arising from that.

Third, the lack of governmental extension services means that high technology crop are often not cultivated in proper manner. For example, there is over-use of pesticides. Such over-use leads to high cost of buying expensive pesticides. Over-use of pesticides also lead to growing pest resistance and replacement of bollworm pests which Bt cotton is designed to resist with aphids which require different kind of expensive pesticides. Knowledge economy cannot account for such institutional failures.

Fourth government retrenchment has meant that the GOI has stopped subsidies of fertilizers and handed over supply of fertilizers to private agents. This privatization has led to considerable rise in prices of fertilizers. This along with the rise of cost of other inputs like pesticides has increased the indebtedness of farmers (Walker, 2009).

Fifth, indebtedness of farmers is also caused by crop failures. There is crop failure due to lack of adequate monsoon rainfall which exacerbate the already existent shortage

⁴⁹ Trade liberalization between 1996 and 2001 led to removal of all trade barriers from agriculture. In the face of uneven competition, prices of all primary products including cotton dropped by 40 to 60% (Walker, 2009).

of irrigation facilities. Crop failure means loss of growth and welfare. Knowledge economy cannot account for contingent factors that distorts market function.

Sixth, farmers are also faced with lack of non-Bt seeds on the market, particularly seeds of indigenous variety. This means that they cannot have the option of low-cost, low-technology oriented crop cultivation. Moreover, due to non-cultivation of non-Bt crop, traditional knowledge of cotton varieties are increasingly being lost. Thus contra knowledge economy prediction, use of patented seeds has not brought about equity for farmers. Instead knowledge economy adoption is leading to destruction of generations of knowledge.

Ever since trade liberalization, and withdrawal of government from agriculture in the early 1990s due to neoliberal dictates, there has been a growing agrarian crisis in India as seen in a steady drop in agricultural yields. Farmers' suicides have been rising steadily under such systemic crisis (Gruere and Sengupta 2011). One can extrapolate that the Bt cotton situation likely exacerbated the already fundamental problems emerging in agriculture, particularly by increasing the indebtedness of the farmers. Farmers often hid their debts from their wives as debt was associated with social stigma. Hence, women had no chance to intervene and help out their husbands. Indebtedness and associated loss of social position eventually led to suicides.

When the GOI allowed for the entrance of Bt seeds into the market, it did not take into account the lack of real control over seeds and land by women. When cultivation of GM seeds of cash crops takes place, women do not have any say in such cultivation. Cash crop mono-cultivation shifts land utilization from diverse crop cultivation, primarily from

food crops and neglected crops that are rich in nutrition. When this shift happens, the diversity of seed knowledge of women that reside primarily in food and neglected crops is steadily lost (Shrivastava 2006). Thus contra knowledge economy prediction, instead of flourishing of knowledge there is underutilization of the seed commons and loss of traditional knowledge over time.

Women get marginalized from growing food crops as well as from growing cash crops. Cash crops are the locus of use of modern technology and is considered by neoliberals as a significant modus operandi of getting out of poverty through enhanced income. According to Tandon (2010), women, however, are typically marginalized in commercial farming of cash crops. They systematically receive less agricultural extension training, access fewer loans for farm development, product development and marketing and are generally less well-represented in farmers' organization than men. Since women till small plots, they cannot produce a high acreage of a single marketable crop. In large-scale commercial and contract farming, multiple cropping, companion cropping or other methods that do not meet the high acreage criteria are systematically ignored. Because women farm smaller plots of land with a range of plants they are de facto excluded from such large scale commercial farming. In such circumstances, women may lose tenancy and become agricultural laborers as part of contract farming to farm a single crop on a large scale. Due to tenancy insecurity, and fear of losing land, women's productivity fall as they are afraid to invest in land to improve quality. Since commercial farming inputs such as GM seeds are highly costly, women cannot afford to invest in cash crops.

With increasing feminization of agriculture female-headed households have increased. In female households, compared to other households there is typically a higher number of dependent children and elderly to each productive adult. Such households have fewer assets and less access to resources. Due to lack of land ownership or insecure tenancy, such households tend to have a greater history of disruption in welfare.

According to Tandon (2010):

women in particular, whose formal rights to land are usually tentative to non-existent, with no legal or procedural mechanisms to protect their interest or to provide them with some channel of recourse or compensation, are destined to lose out completely when there is heightened competition for land' (Tandon 2010: 507).

With land ownership being a problem, women cannot use land as a collateral for borrowing credit for cultivation of high-cost cash crops.

According to Croppenstedt et al. (2013), women are systematically excluded from commercial cultivation. They are victims of a low productivity trap. Women's low access to resources means that they have low participation in commercial or export agricultural production which in turn limits their ability to accumulate resources. The authors cite many studies from around the world to make their point and is relevant for India as a point of analogy. For example in Ghana, where men and women of the same household often farm different plots of land, women are found to have much lower yield, resulting in far lower profits per hectare than their spouses who farmed the same crop. This is because of lower level of access to and inability to use higher levels of factors of production. The factors of production include extra labor, particularly male labor for

strength-demanding tasks like felling of trees; fertilizers; pesticides and insecticides; and improved hybrid seed varieties. Women are unlikely to also have access to machines like tractors and irrigation pumps.

According to Croppenstedt et al. (2013), extension services for cash crops are disproportionately directed towards male-headed households. This stems from the belief that men are decision makers and women are marginal farmers, if they farm at all. Related to this belief is the perception that when men are educated into ways of cash-crop farming, knowledge will automatically be shared with other members of the household. Such beliefs overlooked the different tasks that women have and different crops that are cultivated by women. Such practices also overlook women's constraints on mobility and how women often cannot speak with a male extension agent without her husband or a male relative being present. These factors prevent women from having the same yields as their spouses. In Zimbabwe it was found that women have lower yields in cotton due to lack of access to extension, lack of experience and lack of fertilizer.

Croppenstedt et al.'s (2013) study found that in all regions and in many countries women have less access to land than men do and even when they do have access, it is to small plots of land. Ownership of land, according to the authors, is crucial for weathering shocks and accessing credit and potentially safeguarding investment and crops from expropriation. Women depend on inheritance for land mostly. But, men are more likely to receive land from the community, state, and market. In Latin America, land reforms and redistribution of land benefit males as they are mostly identified as head of households. Women are unable to buy land from the market due to cash constraint and less likelihood

of getting credit, particularly credit devoted to land. When lack of credit is combined with lower earnings, the ability of women to buy land declines further. Weaker land rights also make women leery of leasing land. Women end up being disproportionately engaged in cultivating staple crops or crops that constitute the dominant part of the diet and supply a major proportion of energy and nutrient needs, as opposed to being engaged in cultivating cash crops or crops grown for sale for profit and not own consumption.

According to Croppenstedt et al. (2013), in cash crop cultivation, contracts produced for export crops tend to be signed with men even though women often provide a significant portion of the labor. For example, in South Africa, 70% of sugar contracts are held by men, but, 60-70% of the principal farmers are women. Contracts tend to be signed with men because companies prefer men. This is because of women's limited access to productive resources; women's lack of statutory rights over land and because women have less authority over the family. As export markets evolve, women lose control over export crop and associated land to men. For example, in Malawi with the increase in profitability of hybrid maize, a cash crop grown by men, the land devoted to groundnuts - a cash crop of women - was drastically reduced. Knowledge economy cannot account for such discrimination that lead to market distortions and lack of welfare.

According to Bijman (2008), small farmers, specifically women, face three constraints that limit their potential to increasing productivity and income, particularly from cash crops. First, women lack information about production methods and market opportunities, particularly for crops that they do not normally grow. Second, even with sufficient information about profitable investments, small farmers lack necessary

financial reserves. Third, operating near subsistence, small farmers are more risk averse than large farmers as they prefer to assure themselves of a minimum supply of food before expanding commercial production of high-value risky crops for an uncertain market. In case of cash crops, there is possibility of high loss in case of crop failure, prices are more volatile due to thinly traded markets, yield is more uncertain, and crops are often more perishable (as in the case of horticulture and flowers). According to Bijman (2008), MNCs have a clear preference to contract with large-scale growers. The main disincentive for contracting with smallholders is the transaction cost associated with providing inputs, credit, extension services, and product collection and grading. In case of large landholders there is less possibility of default as they have better skill and more resources available. Such power differentials between MNCs and women farmers cannot be accounted for by knowledge economy.

Contract farming of cash crops is not always good for women involved in agriculture, even though it is considered by neoliberals as an appropriate tool for achieving economic growth and welfare through free market. According to Porter and Phillips-Howard (1997), in many areas of Africa where contract farming has taken hold, relations of reciprocity and cooperation, networks of solidarity trust and tolerance (important constituents of social capital) have been substantially dismantled. Knowledge of seeds tend to reside in such networks of women who come to each other's aid in times of crisis and dismantling of networks lead to loss of knowledge. What is required for continuous growth in store of knowledge of agro-biodiversity is for women to grow food crops under better rights to land and access to multiple ancillary services needed to garner

better productivity. So long as women grow cash crops as part of mixed cropping with food crops (with nitrogen-fixing legumes and cereals that increase soil nutrition depleted by monocropping), they could reap the benefit of both security of nutrition and cash income.

According to Bijman (2008), contract farming creates winners and losers at the community level, and changing relative income of members of a community can create social tensions. Contract farming adversely affect production of basic food crops. With agricultural resources being diverted to contract farming, local farm markets become narrower. Non-contract farmers, such as women, then face thin markets and lower prices for their products. Moreover, there is gender inequality in both quantity and quality of work available on contract farms for women and children. Another major disadvantage of contract farming is dependency relation between producers and contractors. Such dependency make the producers vulnerable to sudden changes in the strategy of the foreign contractors and result in exploitative behavior by contractors.

Contract farming of monoculture of cash crops has led to decline in soil quality, soil erosion, pollution of surface and groundwater by use of pesticides and loss of biodiversity. More critically modern generation of farmers reduced to playing the role of ‘technology clients’ (think extension services) has lost much of their indigenous agricultural knowledge and skills and the integrity of the social organization in which indigenous innovation capacity is embedded (Van Den Berg and Jiggins 2007). Thus, learning and using knowledge of a different kind leads to loss of traditional knowledge. This is a paradox that knowledge economy does not take into account.

The doctrine of free trade espoused by neoliberals heavily emphasizes commercialization of agricultural cultivation and the growth of cash crops as a modus-operandi for increasing income. But, the fact is that commercial cultivation of cash crops has not solved India's widespread malnutrition. This is apparent from its Global Hunger Index score. India, according to a new report by International Food Policy Research Institute (IFPRI) currently ranks 65th out of 79 countries. The report points out that India's nutritional indicators are far worse than its economic indicators merit. IFPRI has sharply criticized India for not moving fast enough to reduce malnourishment. India's GHI score of 22.9 (where anything over 10 is considered to be 'very serious') is back to its 1996 levels. India is only second to last out of 129 countries on the proportion of children who are underweight, which stands at 43.5%. Thus, while India has been growing economically, it has been commensurately falling on nourishment scores. Thus growth has not translated to welfare and there is growing hunger in India. This situation is found at the level of the sub-states too. In 2008, Maharashtra, one of the fastest growing states had a hunger index score of 10 worse than the score of 8 of West Bengal which is a low to middle-income state. Maharashtra's rank was only two grades (12) above that of Orissa, a low income state (Menon et al. 2008).

When women cannot cultivate food crops, women who are providers of food at home find it difficult to meet the food requirements of family members. As a result, food insecurity rises and malnutrition occurs. Malnutrition affects women the most. Because of lower status within the family and under-valuing of women's work, food is unequally distributed within the family. Due to patriarchal social norms, women at home eat last

and hence, eat the least, even though women cook the food. On top of that, women face violence if they fail to provide tasty food (and say no to sex). Under such patriarchal conditions, eating before their spouse would get women labeled as not a ‘good woman’ as termed by the larger society. When pregnant women do not get sufficient nutrition, their in-utero child’s health is also affected. Malnutrition in women also results in reduced productivity, slow recovery from illness, increased susceptibility to infections, a heightened risk of adverse pregnancy outcomes, obstructed labor, lower quality breast milk, and death due to postpartum hemorrhage. Women’s access to food post-pregnancy also depends on whether she has produced a girl-child or a boy-child. Women face stigma and discrimination if they give birth to a girl and such discrimination includes not being given access to nutritious food. This affects breastfeeding of newborn girl-child (Neogy 2010).

Maharashtra is a good example of the rise of malnutrition with the rise in cultivation of cash crops. According to Gruere and Sengupta (2011), agriculture in Maharashtra used to be dominated by rain-fed, low-cost food crops. From there, the state gradually moved towards cash crops, particularly Bt cotton. During this time of transition, malnutrition in Maharashtra has increased.

Malnutrition also increases when women are left destitute by suicides of their spouses; suicides that arises from farmer indebtedness (discussed above). It is hence, crucial to note that Andhra Pradesh, Karnataka, Madhya Pradesh and Maharashtra accounted for 52-65% of the total farmer suicides. Among these states, Maharashtra had a higher share of total farmer suicides and a steadier annual increase. There were three

major suicide peaks which occurred in the years 2002, 2004 and 2006. In 2006, Maharashtra with 4,453 farmers' suicides accounted for over a quarter of the all-India total of 17,060. Between the periods of 2005-2009 over 5,000 farmers committed suicides in Maharashtra. By 2008, there were 199,132 total farmers' suicides in India. In time of crisis, the government tried to provide relief packages, such as, waiving of bank loans. But, such actions failed to take into account that most of the loans were taken from private sources such as moneylenders due to lack of public institutional credit (Gruere and Sengupta 2011) and hence, were unhelpful actions. Overall, governmental efforts proved to be of little help as they did not take into account farmers' demands (en.wikipedia.org).

As a result of the overall agrarian distress, as reflected in farmer suicides, thousands of male farmers have left agriculture (en.wikipedia.org) contributing to growing feminization of agriculture. According to Pellissery and Jalan (2011), when faced with income shock, men prefer to migrate to work in small towns to make up income. The idea is to earn a lump sum of money with which they can buy goods or capital investments. Women on the other hand prefer men to not migrate because they tend to prioritize daily livelihoods through local income generating work, such as that provided by the GOI's poverty-alleviation program MGNREGA, and keeping family together. However, women do not play a major role in intra-household decision-making. According to NFHS 2006, fewer than 30% of married women in India took decisions on day-to-day affairs of the household. Hence, it is not uncommon to find men irresponsibly spending hard-earned money on smoking, alcohol consumption, and so on, that do not

benefit the family in any way. Thus, patriarchy continues to be a significant subordinating factor for women, something that the knowledge economy has failed to alleviate.

Some relief from the above mentioned situations is provided by NGOs. A West Bengal group, SRREOSHI, has made vested land available to women's groups giving them due entitlement. Such land is cultivated by the groups for nutrition and livelihood. Similarly, Navdanya or 'nine seeds' is a women's network of seed keepers and organic producers spread across 17 states in India. Navdanya has helped set up 111 community seed banks across the country, trained over 500,000 farmers in sustainable agriculture over the past two decades and helped set up the largest direct marketing, fair trade organic network in the country. It has actively contributed to preservation of indigenous knowledge and biodiversity of seeds (www.navdanya.org). At the international level, peasant movements like the Via Campesina movement and the Food Sovereignty movement are working to generate local control over local production of healthy local food. These efforts should help bring focus to agrarian crisis and the crisis of human rights in India.

Neo-medieval Governance of Seeds

It is against the above-outlined gendered background of land, seeds and seeds-technology that neo-medieval governance needs to be understood. At the macro-level of neo-medieval governance, TRIPS promises growth of efficient human capital by providing patents as incentives. However, patents on biology acts as barriers to traditional modus-operandi of growth of knowledge and human capital through continuous

adaptation and improvements of plants by farmers. Hence, the use of seed patents is becoming increasingly contested.

In India, neo-medieval governance is a system of overlapping authorities of state, patriarchal structures of caste and class and market that define women's access to seeds and land. In neo-medieval governance it is critical to look at the mezzo level of state political-legal structures regarding seeds, seeds-technology and land. This section explores the issue of laws regarding seeds while the next section delves into the issue of agriculture and land. In case of seeds there has been a growing struggle among the state, the civil society and corporations like Monsanto to define what is a 'property' right. The state project of introducing Bt seeds into the Indian context for developmental purpose is being increasingly contested.

At the micro-level of neo-medieval governance, the state imposition of patents on seeds is being increasingly challenged by feminists and NGOs. As Alkoby (2012) points out, international construction of law is not a one-time act. It is a constant process of construction, interpretation and enactment. Hence, TRIPS regime as part of the WTO institutional law has not been a one-time construction; it has been constantly challenged by non-state actors. The imposition of monopoly patent rights by a free trade regime like the WTO goes against the grain of free trade as it implies less competition. But, more importantly such imposition goes against the grain of international human rights. Hence, the legitimacy of monopoly patent rights is constantly contested by non-state actors. Non-state actors point out that monopoly patent rights on seeds goes against human rights of farmers to cultivate and re-use seeds and is a threat to food security. They then mobilize

civil society to protest and demand that the state recognize human rights as first priority over patent rights of corporations. The human right activism of non-state actors in the Indian context has successfully brought about a moratorium on Bt seeds in the context of food crops. This provides hope that there will be better attention paid to human right to life through better provision of nutrition.

According to Hale et al. (2011):

health landscapes at once constitute and are constituted by relationships between physical (e.g., biological, environmental factors, and man-made objects) and social structures (e.g., political economic and cultural) [Hale et a. 2011: 1854.]

Women's health depends on food security. In agriculture this means having access to land and seeds. For millennia, women have conserved wild relatives of crop plants which provide the germplasm of the cultivated variety. They have also developed various novel forms of seeds through monitoring of phenotype of crops. But, such knowledge of crops on which women's health depends is being denuded within local norms of patriarchy which increasingly emphasize the cultivation of patented cash crops at the expense of cultivation of women's food crops.

To understand the importance of seeds to women's food security and health it is critical to review farmers' and breeders' rights. Farmers' rights are based on in situ 'initial varieties' that they can save, use and exchange. The concept of formal breeders' rights are based on ex-situ development of other varieties or those that are derived from initial varieties (Gupta 2005), mostly with the help of biotechnology

The GOI has sought to undertake measures to resolve the tension between farmers and breeders rights, but the efficacy of such steps is still very doubtful. For example, the GOI has sought to incorporate farmers' rights legally by passing the Protection of Plant Varieties and Farmers' Rights Act (PPVFA) of 2001. Community-level farmer bred varieties cannot be registered for protection. The law allows for registration and protection of new varieties by private breeders.

In 2004, India took steps that undermined the objective of PPVA. It introduced a Seeds Bill Act and a Patent Ordinance. The purpose was to encourage seeds trade, promote the seed industry, boost exports and protect seed quality. This aggressive drive towards privatization was unrealistic. India cannot compete in a market that has trade barriers of high levels of agricultural subsidies in developed countries. The new Seeds Act opened up the use of Bt seeds, both of food and cash crop variety, by Indian farmers and thereby opened up the possibility of food insecurity. This brought on civil society push-back from the famous eco-activist Vandana Shiva, her organization Navdanya and Greenpeace. The new Act had demanded that farmers register their varieties compulsorily. Under the new Act the farmers would be punished for planting unlicensed varieties. Hence, they would have been pushed into dependence on corporate monopoly of patented seed. The new Seeds Act would have prevented age-old farmers' tradition of selling crops to neighbors as seeds and exchanging such seeds for further cultivation and reproduction. This system had for millennia produced open pollinated, time-tested, high-value, quality seeds that helped maintain agro-biodiversity. But, patents on seeds have transformed seed saving into an 'intellectual property crime.' Farmers would have been

forced out of growing native seeds and been forced to use seeds provided by the agribusiness controlled seed industry, particularly genetically modified (GM) seeds. Such seeds typically are engineered to be sterile by use of Terminator Technology and farmers would have been forced to buy seeds repeatedly as they could not re-use seeds. Thus, MNCs would have decided what was grown by farmers, what they would use as inputs, when they would sell their produce, to whom they would sell their produce and at what price. Seeds thus would have become commoditized to an extreme degree and small farmers would have become more marginalized and indebted as they would have been forced to buy seeds repeatedly. In the face of civil society push-back, the Seeds Act got revoked and prevented major disaster in agrarian sector (Shiva 2005).

Under TRIPS regulation, the Amendment of the 1970s process patents Act into product patents made seeds a domain where commercial monopoly could be developed. But, according to Shiva (2005) 80% of all seeds in India is still saved by farmers. She believes strongly that plants and seeds are not human inventions and therefore, not patentable. Farmers' indigenous varieties are the basis of ecological and food security and farmers should have seed sovereignty. One does not only need private profits to be innovative. The satisfaction of creation is often a good enough motivator. Thus, Indian farmers have made innovative developments in seed varieties. For example, coastal farmers have evolved salt resistant varieties. Bihar and Bengal farmers have developed flood resistant varieties. Rajasthan desert farmers and semi-arid Deccan farmers have evolved drought resistant varieties. As for quality of such seeds, Shiva (2005) felt that the Seed Act of 1966 already performs the function of seed testing and certification. There

were 20 labs that tested seeds and 9 corporations that certified them. Under pressure from the World Bank, the Seed Policy of 1988 started to dismantle this robust public sector which accounted for 20% of the seeds that farmers grow. The new Seeds Act would have further exposed the farmers to untested and hazardous seeds being sold by the MNCs. For example, the constant failure of Bt. cotton annually is costing more than a billion dollars to farmers.

Shiva (2012) views IPRs as a prescription for famine as it encloses the seed commons and undermines the community nature of cultivation that provides for social support in times of crises. She points out that 250,000 farmer suicides have taken place in India, so far, mostly due to the use of Bt. cotton.

Shiva (2012) blames corporations like Monsanto for stealing local knowledge. She points out that India has signed an US-India Knowledge Initiative in Agriculture, with Monsanto on the Board. Individual sub-states are being pressurized to sign agreements with Monsanto. One example is the Monsanto-Rajasthan Memorandum of Understanding (MOU), under which Monsanto would get IPR to all genetic resources, and would be allowed to carry out research on indigenous seeds. A campaign by Navdanya and a 'Monsanto Quit India' Bija Yatra (seed pilgrimage) forced the Rajasthan government to cancel the MOU.

Clearly, when it comes to GM seeds different incentives play out at the sub-state levels. For example, Gujarat allows for the spread of illegal transgenic GM Bt. cotton

developed by a banned and unlicensed local company. But, Maharashtra, the home of Mahyco-Monsanto Biotech Company does not (Pray et al. 2011).⁵⁰

Beyond state and sub-state level initiatives and responses to the spread of Bt seeds, it is critical to understand the individual level adaptations to the spread of Bt seeds. Stone (2007), through exploration of Bt. cotton cultivation in sub-states Andhra Pradesh and Gujarat, points out that biotechnology can have the paradoxical effects of birth and death of traditional knowledge (TK). Birth of TK can be seen in the form of dynamic management skill where farmers actively but ‘illegally’ experiment on Bt. cotton seeds developed by a banned and unlicensed local company; create their own hybrids; sell said hybrids and propagate the knowledge of the experiment to others. Success is not guaranteed but at least efforts are being made. Death of TK, for Stone (2007) represents deskilling of an ongoing dynamic process of skilling in TK or the degradation of farmers’ ability to perform based on environmental learning. Instead of using their traditional experimental methods of seed testing, lower classes of ‘male’ farmers, particularly, resort to ‘maladaptive’ social learning about seed technology adoption. The farmers learn of seed adoption in a highly unreliable and ‘deceptive’ information environment promulgated by corporations and local sellers and changing dynamics of ecological environment. This leads to unsustainable fads of cultivation without proper experimentation of the actual validity of the outcomes of planting such seeds with regard to issues such as boll size, water requirements, time-to-maturity, and resistance to any crop pests.

⁵⁰ Pray et al. (2011) sees wonderful benefits from use of biotechnology.

While there is individual level variations to adaptation to Bt seeds, patterns of adaptation can have differential effects. For example, when there is death in use of TK, decline on self-reliance among male farmers takes hold. In the background of state apathy, as seen in Maharashtra, indebtedness of the farmers increase. Indebtedness is the outcome of high costs of cultivation, poor irrigation, and use of chemical fertilizers. This indebtedness has led to massive suicides among the male farmers (Dongre and Deshmukh 2010).

The threat that Bt seeds pose for women can also be seen from the following example. Given that rice cultivation is the domain of women, here it is critical to explore a new trend that has emerged recently in the international community. The corporate giant Astra-Zeneca has created a GM rice engineered to produce beta carotene that provides for Vitamin A. It is offering Third World farmers free access to this grain so that the scourge of Vitamin A deficiency (VAD) can be tackled. According to Arlappa et al. (2011), VAD leads to blindness in young children, increases incidences of mortality related to respiratory infections, diarrhea and measles, and also causes childhood morbidity. Hence, on the surface this new project seems like a benevolent move, but the Institute of Science in Society (ISIS) has provided a scathing critique of this GM rice.

ISIS has multiple critiques of the golden rice. First, the company did not make it clear whether the Third World farmers will be allowed to save the seeds for replanting. More critically, the new GM rice is not really a real progress. The modified gene lies in the endosperm, i.e. the part of the rice grain that remains after it has been polished. Unpolished rice already contains beta-carotene and other essential vitamins and minerals

and is typically consumed by the poor. If they do not, as the creators of golden rice presume, then a portion of every rice harvest can be kept unpolished and either given freely to the poor or sold at the cheapest price.⁵¹ Moreover, there is already a FAO program from 1985 that deals with Vitamin A deficiency using a combination of food fortification, food supplements, and general improvements in diets by encouraging people to grow and eat a variety of green leafy vegetables. Herbal gardens are already the domain of women who cultivate vegetables (Torri and Hollenberg 2012) and hence, such vegetables should not be difficult to procure. One main discovery of FAO was that the absorption of pro-vitamin A depends on the overall nutrition status which in turn depends on the diversity of food consumed. Predominant rice consumption and of a single-variety, a side effect of the Green Revolution and the loss of paddy varieties due to monoculture, has resulted in massive iron-deficiency in the South Asian population. The cure for Vitamin A deficiency is thus not golden rice but a more sustainable bio-diverse agriculture and more consumption of a varied diet. Hence, the whole logic of developing golden rice is fallacious.

ISIS points out that the golden rice also comes with multiple hazards. The gene constructs are new and have never existed in billions of years of evolution. It has been spliced with a combination of genes from viruses and bacteria. The transgenic DNA is structurally unstable, leading to instability of the GM plants in subsequent generations, multiplying unintended random effects. Horizontal gene transfer from GM fields of rice

⁵¹ According to Sarkar et al. (2013), in India, traditional coarse cereals with complex carbohydrates and high protein is being replaced by mill-polished rice with simple carbohydrate and low protein.

into soil fungi and bacteria can lead to the development of superbugs. Invasive genes in horizontal transfer and cross-pollination can also lead to pollution of other species and prevent the growth of bio-diversity. Under such circumstances, according to ISIS,

‘to offer the poor and malnourished a high-tech ‘golden rice’ tied up in multiple patents, that has cost US\$ 100 million to produce and may cost as much to develop, is worse than telling them to eat cake’ (ISIS: 2).

The whole idea of golden rice is an attempt to polish the GM industry image of being pro-poor when in reality it is not a real cure for the poor. The rice has been developed by the Rockefeller Foundation, the Swiss Federal Institute of Technology, the European Community Biotech Program and the Swiss Federal Office for Education and Science. Since Rockefeller Foundation’s mission is to support scientific research that specifically benefits the poor, it is not surprising that it has withdrawn from this initiative.

As evident from the example of the golden rice, one can see that GM food crops are highly problematic and their introduction in the food supply chain tend to bring out resistance from the civil society. According to Alam (2011), in 2009, Bt. Brinjal was the first in a series of GM food crops to be considered for commercial release in India. Bt. brinjal was created by the introduction of ‘cry1Ac’ gene into the plant. The purpose was to make the crop resistant to insects such as the Fruit and Shoot Borer and the Fruit Borer that are responsible for 60% of crop damage. A number of farmers’ associations, nativist groups, left-oriented progressive movements, environmental NGOs and domestic pesticide lobbies gathered forces against Maharashtra Hybrid Seed Company, a subsidiary of Monsanto. They pointed out the risks associated with transgenic crops, the

corporate ownership of technology and its implications for farmers' rights to seeds, consumers' choice, biosafety and food security. Biosafety concerns included risks of allergic reaction to the plant on consumption. There was also concern that the genetic modification process may re-engineer the biology of the plant causing it to generate toxins. It was argued that the danger is greater in the case of brinjal because it belongs to the solanaceae family of plants, which has a natural tendency to produce toxins. In India, brinjal is consumed only lightly cooked or raw and this increase the risk of poisons in the plant. Moreover, the raw plant in its various varieties is widely used in traditional medicine such as Ayurveda and Siddha. Transgenic changes to plants and possibility of increased toxins would hamper the process of medicine formulation. Transgenic changes also represented a threat to current bio-diversity of 2,500 plant variety. Use of transgenic seeds would increase monoculture and also threaten biodiversity.

The prospect of introduction of Bt. brinjal created civil-society movements as push-backs because of the experience with cash crop Bt cotton. India is the second largest producer of cotton in the world claiming 30% of the world's cotton acreage in the 2008-09 compared with 20.5% of China. Since being introduced in 2002, 80% of cotton is currently grown with Monsanto seeds and yet India's yields falls short of that of China. India's cotton yield is 17.8 million bales compared to China's 33.5 (Stewart 2011). Moreover, China has an indigenous Bt. technology and the cost of Bt. cotton seeds is only slightly higher than non-Bt. ones. In India, public R&D in agricultural biotech does not even compare to private R&D. This has potentially led to the control of the GM hybrid market by a single corporate entity (Alam 2011), Monsanto. Moreover, the

drought of 2008-09 caused severe shortage of irrigation in India where irrigation for cotton is already very small. Extension centers run by the local governments failed to provide farmers with adequate information and training regarding growing new varieties of cotton. This forced many farmers to rely on information given by private seed companies (Stewart 2011). This in turn increased their dependence on MNCs. All of these factors increased resistance to the introduction of Bt. brinjal and finally, under pressure from civil-society, the GOI put an indefinite moratorium on the introduction of the crop.

According to Vandana Shiva, food systems evolved by women that is based on biodiversity production rather than chemical-based production produce hundred times more food with better nutrition, quality and taste (Stewart 2011). Shiva (2013), points out that the industrial-corporate system of food production uses 10 times more units of energy as inputs than it produces as food. It wastes 50% of food produced, uses and pollutes 70% of water on the planet, has destroyed 75% of biodiversity in agriculture, contributes to 40% of greenhouse gases. All such activities destabilizes climate and threatens food security. GM seeds with Terminator Technology goes against the grain of nature and shrinks abundance of life and further creates for food insecurity. Hence, seed sovereignty of farmers is something that must be closely guarded.

In neo-medieval governance of seeds one of the critical consequences has been farmer suicides. According to Shah (2012) it is not enough to blame the suicide of middle-class farmers on external forces. It is also important to look at how those forces interact with history, culture and agrarian and social relations. For the author, behind the

experiences of agrarian vulnerability there are certainly causes, such as, declining state welfare, scarcity of resources, and the loss of remunerative market. However, vulnerability also arises from a long history of social imagination of dispossession and violence, the fear of pauperization and the social stigma attached to it which leads well-off farmers to commit suicide and abandon their wives and children.

Farmers' suicides have occurred in the 5 core Green Revolution states - Maharashtra, Andhra Pradesh, Karnataka, Kerala and Punjab. In trend with the history of high-input agriculture of Green Revolution, middle and small scale farmers have been adopting increasingly more capital intensive technologies in order to survive and become upwardly mobile. At the same time the neo-liberal policy formation of state withdrawal has led to reduction in gross capital formation in agriculture, reduction in the proportion of institutional credit in the total borrowed credit of the farmers. State withdrawal has produced an increase in farmers' dependence on private or informal sources not only in credit but also in the procurement of various agricultural inputs, extension services, and so forth. This has put pressure on the farmers by increasing their overall costs. Furthermore, the transgenic cotton crop developed to withstand pests has over time developed tolerance to pests leading to an even higher requirement of pesticides and even higher costs for farmers (Alam 2011). When revenues have not risen, this high cost has translated into a large-scale agricultural crisis for the farming community (Vakulabharam, 2013). With constant rising costs, the smaller farmers have thus become crisis prone. In Maharashtra when such production crisis is combined with consumption

crisis especially those related to marriages, deaths and illnesses, farmer suicides have risen (Vakulabharam 2013).

Suicides of indebted male farmers lead to severe pressure on women in terms of being burdened with emotional trauma, debt and impoverishment (Gandhi 2010). This consequence occurs because women have least say in what would be cultivated. When women are independent, their focus is less on cash crops and more on staple crops like rice and wheat. Women focus more on crop diversity in order to cope with environmental demands and ensure nutritional security (Pionetti 2006). With implementation of TRIPS and patenting of seeds such security issues for women are being threatened.

Neo-medieval governance of seeds has seen a constant tussle between the state, civil society actors and private companies, a struggle that knowledge economy does not predict. The outcome has sometimes been favorable as has been seen in the case of moratorium on Bt brinjal and 2004 Seeds Act. But, the struggle still continues as the emphasis under knowledge economy grows on cash crops rather than food crops. Decline in cultivation of food crops has added to problems of food insecurity and malnutrition.

Knowledge Economy, Neo-medieval Governance of Land and Agriculture

Knowledge economy promises substantive growth and welfare through free trade. It promises to use extant knowledge and new knowledge to improve the productivity of agriculture. However, in agriculture in India growth has been steadily declining as can be seen in declining yields. This has been accelerated by the fact that women as producers have steadily filled the rank of laborers rather than being owners of land. Ownership of land would have garnered greater security, better investment in land, greater productivity

and greater yields. Moreover, discrimination against women is rampant in agriculture which further prevents them from achieving welfare. Contra knowledge-economy prediction, efficient human capital has thus not flourished. Knowledge economy promises shifting human capital from low productivity subsistence agriculture to high productivity scientific activities. An example of such activity is the growth in contract farming of high-value crops. However, such activity has not benefitted women significantly due to lack of land ownership. Women work as laborers with low wages on contract farms.

Knowledge economy is embedded in neo-medieval governance. At the mezz-level of neo-medieval governance, the state plays a critical role in ensuring welfare and human rights. The GOI has made some efforts to provide better conditions for achievement of welfare through new laws, but such actions still have a long way to go before women can attain welfare. At the micro-level of neo-medieval governance non-state actors play a critical role in providing for welfare. Such actors have tried to provide some relief to women cultivators, but, the situation of agriculture is still dire in India. When women who are mostly involved in agriculture cannot earn a decent living, their welfare, particularly health welfare is denuded. Under such circumstances, efficient human capital cannot be formed. This section overall points out how knowledge economy and free trade has failed to uplift women and bring about women's welfare.

Let's begin by looking at the condition of agriculture first. Knowledge economy promises a shift from low-productivity activities to high-productivity activities as a result of free trade and liberalization. Accordingly, agriculture should be a less important contributor to the economy and less people should be engaged in agriculture. But in

reality this does not pan out. While agriculture's contribution to GDP has been declining, there is still a substantial portion of people engaged in the sector. According to Vakulabharam (2013), more than 55% of the workforce is engaged in agriculture, while the sector has been contributing to less than 20% of GDP.

According to Kayarkanni (2013), in 1970-71, agriculture contributed about 44% of GDP and by 2009-10 the contribution to GDP has declined to 14.6%. In comparison, to this declining GDP contribution, the sector remained a major source of employment for 52% of the total national work-force in 2004-05, down from 70% in 1971. This shows the declining condition of agriculture in India. While this sector has been slowly declining due to the thrust on services, this shift has not helped to accommodate the transition of the majority of the populace that are engaged in agriculture to services.

According to Ghosh (2013), agricultural GDP has reduced from 2.88% in 1993/1994-1999/2000 to 1.76% in 1999/2000-2004/2005. In Maharashtra, the annual growth rate of net state domestic product (NSDP) went from 4.34% in 1981/1982-1990/91 to 1.85% in 1991/1992-2006/2007. During the same period, Bengal's NSDP went from 6.06% to 2.93%. The state of agricultural growth was thus better in Bengal. Despite interstate variation, agriculture as a sector has been declining due to overall government neglect. While this might be in line with prescriptions of knowledge economy, in reality women who are mostly employed in agriculture are harmed by lack of government attention to development of the agricultural sector.

Declining agricultural conditions affect women as they are the major producers in agriculture. According to the NSS 1999-2000 data, 85% of women are engaged in

agriculture (Deshpande 2007). According to Gillespie and Kadiyala (2012), in 2004-05, two-thirds of the female labor force in India was employed in the agriculture sector and in rural areas this proportion was 83%. These facts point to increasing feminization of agriculture.

Agricultural growth, even in its limited form, has not translated into better equity for women. According to Kayarkanni (2013) current growth rate in agriculture is 3.3% and agriculture accounts for 13% of the country's exports.⁵² According to Dutta and Sharma (2010), India is the world's largest producer of milk, cashewnuts, coconut, tea, ginger, turmeric and black pepper. It is the second largest producer of wheat, rice, sugar, groundnut and inland fish. India accounts for 10% of the world's fruit production with a number one rank for production of banana. According to the Indian Planning Commission's 2007 Report, based on 1993-94 prices, between the periods of 1997-98 and 2003-04 the horticultural sector grew at a rate of 3.66%. India's top ten exports are different forms of rice, including basmati, cane jaggery, mango pulp, groundnuts, maize, guar gum, onions and bovine meat. According to Kayarkanni (2013), the share of agricultural exports in total export value declined from 18.5% in 1990-91 to about 10.6% in 2009-10. But, despite the limited growth, 50% of those who feed India and contribute

⁵² According to Walker (2009) the central government, following neoliberal reform, has deregulated the banking sector and abandoned the policy of making agriculture as priority sector for low cost interest rates from banks. Banks now focus on profitability and on developed regions. Banks tend to suck up deposits from less developed regions and funnel them to activities in more developed areas. This has increased regional inequalities. Maharashtra is one of the most developed states that receive maximum bank loans in areas such as movies. And yet, as we will see later, it is still a state that has high rural poor and suffers from severe malnutrition. Thus there are regional inequalities not just across India but also within state. Urban India is privileged and developed over rural India.

to its export earnings only share 17% of India's GDP or less than a quarter of the nation's income. Thus, growth in free trade has not led to equity for poor women.

Also concerning is the fact that agricultural yields have been falling. According to Sarkar et al. (2012), from 1962/65 until 2003/06, the gross crop area (44 major Indian crops) increased by approximately 15% while the irrigated area has more than doubled. The average rate of growth of agricultural yield per year though has been falling steadily from 4.4% between 1980-90 to 2.8% between 1991-98 to 0.6% between 1999-09 (Gillespie and Kadiyala 2012). Overall fall in agricultural yields means that free trade has not brought about growth.

According to Gillespie and Kadiyala (2012), the annual growth rate of public investment in agriculture declined from 4.1% in the 80s to 1.9% in the 90s.⁵³ Hence, it is not surprising that per capita daily food grain availability in 2006 was the same as during the drought years of the 70s. There has been a simultaneous rise in net exports and additions to government buffer stocks. But, there has been falling calorie consumption amid excess national grain stocks due to inefficiency in Public Distribution System (PDS). Due to increasing feminization of agriculture women have been bearing the brunt of such inefficiency. In short, knowledge economy and free trade has not brought about efficiency or equity.

⁵³ According to Kayarkanni (2013), public investment in agriculture is critical and important, However, in actual terms, it forms 20% of total investment in agriculture; 80% comes from the private sector. Moreover, in the early 80s the share of public and private sector (including household sector) in gross capital formation in agriculture was roughly equal but by the early 2000s the share of the private sector was four times larger than the share of the public sector at 2004-05 prices.

Alarming, for women, they are being alienated from land and becoming agricultural laborers with uncertain employment opportunities. According to Ghosh (2013), agricultural labor households and primarily cultivator households consist largely of small and marginal farmers. These are the rural poor. According to the NSS 1999-2000 report, 20.21% of the households were self-employed in agriculture, 29.66% of the regular wage earning workers and 40.98% of the casual agricultural workers were living in poverty. These three categories of households together constitute 81.8% of the poor households in rural India.⁵⁴ Compared to self-employed rural households, both agricultural and non-agricultural, rural labor households, both agricultural and non-agricultural are the worse-off economic group in terms of extent and depth of poverty. When marginal and small farmers are alienated from their land and become agricultural laborers, there is an end to traditional form of self-provisioning.⁵⁵ When this happens, agricultural laborers become completely dependent on the vagaries of market for their livelihood, the security of which depends on the availability of employment. With unemployment on the rise, per capita income declines and poverty increases.

Employment is a key source of livelihood sustainability for the rural poor who have become agricultural laborers. According to Ghosh (2013), the period between 1972/1973 - 2009/2010 witnessed a declining trend in the growth rate of rural

⁵⁴ According to Kayarkanni (2013), according to a 1991/92 survey, 11.25% of rural families are landless. Among the landholders, 69.35% own less than 1 hectare and are marginal farmers and 21.25% own between 1 and 2 hectares and are small farmers. Due to growing population pressure such landholdings are becoming more fragmented and land scarcity is increasing.

⁵⁵ According to Walker (2009), in 2007, more than 80% of holdings was less than 2 hectares and 60% of peasantry had less than 1 hectare. This makes agriculture unviable and forces people to join the landless and unemployed.

employment in India. Going by the growth rate of usual principal status (UPS), rural employment rate went from 1.8% during 1983-1993/1994 to 1.32% during 1999/2000-2004-05. Employment rate declined further to 0.2% during 2004/2005-2009/2010. During this period there was a sharp rise in labor force. Hence, the UPS unemployment increased from 1.8% in 1993-94 to 2.1% in 2009-2010. In Maharashtra, an economically fast-growing state, UPS unemployment rate went from 0.8% in 1993-94 to 1.6% in 2009-2010. But, according to current daily status (CDS) unemployment rate went from 4.3% to 7% during the same period. In West Bengal, a low-medium income state, UPS went from 1.8% in 1993-94 to 2.7% in 2009-2010. Concurrently, CDS unemployment rate went from 9.1% to 7.4% during the same period. Thus, compared to Maharashtra, Bengal saw a drop in unemployment, though the drop brought Bengal's level closer to that of Maharashtra. At the same time as unemployment has been rising, real agricultural wage rate declined from 2.74% in 1993/1994-1999/2000 to 1.46% in 1999/2000-2004/2005. These are measures of growing pauperization in agriculture. Thus, adoption of knowledge economy has not brought about equity in agriculture.⁵⁶

According to Deininger et al. (2013), women are discriminated against in employment in India because of the patriarchal system of social norms. The discrimination in informal markets is more pronounced than in formal ones. Compared to less than 30% of gender wage gaps in formal labor markets, 61% of gender wage gaps for all casual workers and 76% of the gap for agriculture workers is attributable to

⁵⁶ According to Khor (2008) a 10% rise in agricultural productivity could bring about a 4% reduction in poverty. However, there is difficulty in achieving this outcome because of resource-limitation of land, seed, machinery, credit, market, and so on. Hence, women tend to be increasingly laborers. As laborers they face problems of high unemployment.

discrimination. Discrimination in rich villages is higher than in poor villages so that growth alone may not make it disappear. Discrimination is likely to decrease human capital accumulation, technology adoption, overall growth and equilibrium wage rates. It has been estimated that a 10% increase in the female to male worker ratio increased net domestic product by 8% and raising levels of female employment nationally to those in Karnataka, the most advanced state, could increase output by 45%. Moreover, wage discrimination are larger than the benefits provided through programs such as the PDS on which the government continues to spend large amounts.

According to Deininger et al. (2013), wage differences in SCs and STs and the rest of the population reflect differences in endowments like land rather than discrimination. In the authors' large-scale study, 35.82% of SC and ST were landless compared to 21.25% among the non-SC and ST. The share of female participation among SC and ST was 31.88% as opposed to 23.62% among non-SC and ST. The share of days spent on wage work was 54.39% among SC and ST as compared to 23.62% among non-SC and ST. The authors point out that recent reforms like the 2005 Hindu succession Act has increased the possibility of women accessing productive assets like land through inheritance. Such reforms would also make it easier to access credit via self-help groups and make it easier for women to be self-employed. The authors point out that for females, returns to self-employment are significantly higher than can be obtained in wage labor markets. Hence, there is a need to increase access to productive assets. However, this is still a distant dream in India.

Unlike Deininger et al. (2013), Sabharwal (2010), finds discrimination against low caste women in agriculture. According to the author, in the agricultural sector, SC women face complete denial in hiring; exclusion from certain types of jobs; selective inclusion with unequal hiring terms and conditions with respect to hours of work and other terms; hiring for work which is outside the house; denied work inside the house; compulsive and forced work governed by traditional caste related obligations involving loss of freedom; and wages not being paid or being paid or paid at irregular intervals and at a lower rate than men. But, worst of all SC women face sexual violence and exploitation from upper caste men and verbal abuse from upper caste women. Knowledge economy cannot account for such social identities as caste interfering in mobility of labor.

According to Joshi (2011), Dalit women's situation in agriculture is worsened by caste situation. Women are in general burdened with the chore of collecting and using water for agricultural and household purposes. Dalit women's access to water sources used by upper castes is severely impaired by caste notions of purity and pollution. The neoliberal assumption that ability and willingness to pay would reflect water demand and translate into voice and choice does not really happen.

The prejudice against lower caste women has not been alleviated by legal reforms either. For example, SC women have been granted 33% reservation in Panchayati Raj Institutions (PRI) which goes beyond one-third reservation of seats at the national political level. But, in reality, their rights continue to be denied and they cannot effectively participate in the PRIs to demand changes (Sabharwal 2010). Even with

leadership, women cannot translate the socio-cultural norms of inequity due to lack of pervasive awareness of gender justice and the need to transform it and due to institutional culture of discrimination within the PRI (Bonu et al. 2011). In gender development, however, the situation varies across sub-states. According to Singh and Kumar (2010), in overall gender development Bengal ranks higher than Maharashtra with a rank of 6 as compared to 8 of the latter.

Let's now look at the issue of neo-medieval governance of land. Land is an important but highly scarce resource for women in rural India. According to Ghosh (2013), the Gini coefficient of concentration of operated area was at 0.55 in 2000-01 and remained unchanged in 2005-06. More alarmingly, the Gini coefficient of concentration of owned area went from 0.71 in 1971-72 to 0.74 in 2003. This shows high inequity in ownership of land. Small and marginal farmers have been on the rise but the proportion of their total holdings have declined. There is regional disparities in Gini coefficient of concentration of operated area. So, in Maharashtra, it was 0.47 in both 1995-96 and 2000-01. In Bengal, it was 0.37 in 1995-96 and reduced to 0.32 in 2000-01. Bengal's lower Gini coefficient can be attributed to its significant tenancy reforms. Despite being home to only 2.31% of India's population the ex-left-front government of Bengal had conferred on 22.88% of the total number of tenants ownership rights. In terms of land ceiling laws, although West Bengal accounts for 3% of India's land resources, its share of total surplus of land distributed was almost 20% of the all-India figure (Ghatak and Roy, 2007). The regional disparity continues despite two proven factors. First, small farms tend to be more productive than large farms. Second, owner-cultivated plots of land tend to be more

productive than those under sharecropping tenancy. Hence, land-ownership for women would not only generate equity but also efficiency (ibid).

Land reforms record in India is very poor. Consequently, ownership of land by women is highly problematic. Even when they own land their yield/productivity is low due to lack of resources. Hence, they have not been hired as landowners in the new trend of contract farming in India. There is a recent rise in India of contract farming where landowners or tenants have contracts with agribusiness marketing and or processing firms, who specify prices, timing, quality and quantity/acreage of the produce to be delivered. The arrangement may include the supply of inputs by the agribusiness firm who may even control and supervise farm operations in some situations (Singh 2003). Such contract farming has typically gone to large and medium scale male farmers. Women in general tend to be largely excluded from contract farming but, they provide the bulk of the wage labor in this non-traditional export sector of high-value crops. Though women provide the bulk of the labor, agribusiness companies' male representatives contract with 'progressive' (risk-takers) middle class and large-scale male landowners (Croppenstedt et al. 2013; Pritchard and Connell 2011).

According to Singh (2003), women employed by contract producers tend to experience poor terms and conditions. Women's wages are lower and stickier i.e., wages do not rise as fast as that of men. Women's working conditions are poorer and bargaining power is more limited. Women are increasingly employed to do more delicate work because of their supposedly feminine traits such as docility, obedience and nimble fingers. For example, in cottonseed production in Andhra Pradesh, children do the most

labor intensive work of cross-pollination and harvesting of cotton. Due to such desired quality, girl child workers are increasingly being employed. They have to work for 8 hours a day, eight-nine months a year and their contractors bear no responsibility for their health. In the case of organic cotton farming in Madhya Pradesh, Upadhyay (2005) points out that women are paid half of the amount paid to men for the same work and they are offered poorer working conditions. Such patriarchal discrimination cannot be accounted for by knowledge economy.

In the face of depressing future for women in agriculture, Agarwal (2010) provides innovative example of women coming together to overcome the constraints of owning land. She provides ethnographic studies of successful joint-farm enterprises/collectivities of poor women. For example, in Andhra Pradesh, with the support of the NGO Deccan Development Society (DDS), which works in drought-prone tracts of Medak district, poor, low-caste women have been able to lease in or purchase land in groups through various government credit schemes and cultivate the land collectively. DDS' approach seeks to ensure food security in an environmentally-friendly way through organic farming and multiple cropping. The group leasing program was started in 1989 and by 2008, it involved 144 women organized into groups (sangams) of 5 to 15 across 26 villages, cultivating a total of 211 acres. About 25% of the rent is paid by sangam members and the rest is covered by interest-free loans from DDS, which the group then repays in installments. Very poor women who lack cash compensate through payment in labor. All tasks are shared except for ploughing of fields for which the women hire tractor services. After paying the rent and other costs as well as DDS' loan,

and keeping aside grain for seed, the harvest of each crop is shared equally among the members.

In Agarwal's (2010) case study, similar to the lease program, the group land purchase program draws on a state government scheme that provides subsidized credit to groups of landless Dalit women for collectively buying agricultural land. With the help of the DDS women form a group and apply for the loan after identifying the land they want to buy. The purchased land is divided equally among the 'group' members and registered in 'individual' names. In 2008, 25 women's groups constituted of 436 women were cultivating 555 acres of purchased land in 21 villages. While most of the sangam women are Dalits, the farmers from whom they lease or purchase land are predominantly upper caste men, with a small proportion being Muslim or backward castes. Since, the sangam women are seen by the landlords as reliable tenants, despite caste hierarchy, many landlords now voluntarily approach them for leasing out their land. This is in contrast to the initial period when it was the women who approached the landlords for a lease. Usually leasing precedes purchase. This helps the women to judge the land's quality and potential productivity; assess how well they can function as a group; and in some cases even save enough from good harvests to buy land. The lease groups typically consist of a mix of landless women and women whose households own one or two acres. Such a mix is encouraged by the DDS to ensure that each group has some women with farm management skills. As a group, the women can then learn how to hone their farming skills, build trust and solidarity, and tackle conflicts and free riding. Such experimentation enables the group to evict defaulters prior to actual purchase. In such

groups, women grow up to 24 crop varieties a year (the seeds of which they preserve). This reduces the risk of crop failure and provides a balanced, subsistence diet. Moreover, women's social networks that cross across caste and religious lines allows uncodified knowledge of seeds and cultivation to be transferred. This allows for linear and radical innovation.

There is no one-size fits all solution to India's land problems. Cooperative efforts as described by Agarwal (2010) are not always successful. For example, Datar (2007) tried to organize landless Dalit women from 9 villages in Osmanabad district of Maharashtra with the help of DDS for joint-cultivation of land for horticultural production of fruits. Her efforts proved to be a failure. This was because of multiple barriers. First, there was women's deep-rooted ideas as laborers which prevented them from visualizing themselves as entrepreneurs. Second, social barriers such as caste prevented not only access to common land such as gairan/wasteland but, also to water. Third there was lack of access to grants from government schemes for such purposes due to corrupt activities of the government machinery which in turn engendered lack of trust. Fourth, the fear of loss of wage-labor in undertaking a risky scheme whose payment is not 'regular' in terms of daily/monthly wages acted as a disincentive to enterprise. Lastly, the women's fear of reprisal from their husbands who may not be agreeable to their idea prevented them from developing a 'collective spirit' of working together. Most women in the study thus preferred individual activity over collective work.

Women often have to reverse lease or sell their land due to lack of enough credit to cultivate the land and in order to gain cash to tide them over emergencies. Such

emergencies include massive droughts and floods due to global warming. For example, the Marathawada region in Maharashtra experienced three years of continuous drought (Datar, 2007). West Bengal is severely threatened by tropical cyclones and floods that destroy life and property (Scheffran and Battaglini, 2011). This increases the level of inequity. According to Papola (2010), as a whole, in 2002-03, landless people in India had a total income of Rs. 1,380 while their consumption was Rs. 2, 297. In comparison, marginal households had an income of Rs, 1,899 and a consumption expenditure of Rs., 2,672. Since consumption exceeded earnings, indebtedness increased. Free trade has not resolved such fundamental problems in India.

According to Sarkar et al. (2012), land ownership is a significant factor for household food security and nutritional status. According to Gillespie and Kadiyala (2012), increasing feminization of agriculture and labor force of agriculture has had severe consequences on the welfare of women. Women's socio-economic status, their control over resources and their ability to influence household decision-making and intra-household allocation of food, health and care has changed. There is now more burden on women to manage the care and feeding and health of young children. There has been an impact on women's own nutritional status when their work-related energy expenditure exceeds their intakes, their dietary diversity is compromised or their agricultural practices are hazardous to their health which in turn may impact their nutritional status.

According to Biswas (2011), land in India has become highly contentious as seen in the uprising of the Naxalite movement. This is because the GOI has been using a 117 year old colonial law called the Land Acquisition Act to forcibly obtain land without the

consent of owners to build roads, bridges, factories, highways and homes. All such acquisitions is claimed to be in public interest. The law has been tweaked over the years but it essentially remains unfair and antiquated. Some 40 million people have been displaced by land takeovers since 1950. When one considers the fact that 70% of India's people live off the land, that India has the second largest arable land area in the world after the US, and that there has hardly been any land redistribution, it is not surprising that land becomes an explosive issue socio-politically.

The GOI has sought to introduce some land-related ameliorative measures. It has introduced a new Land Acquisition and Amendment Bill. The law proposes to pay farmers up to six times more than market rate of land. Compensation would also be paid to people who would lose their livelihood in the process. The government would gain the consent of 80% of land owners before their land is sold for industry. Cash and other assets would be paid into accounts held jointly by men and women to minimize chances of men blowing up the money. If the acquired land is not utilized within 5 years, then it would be returned to the ex-owners. Most critically, attention would be paid first to less fertile and waste lands and then to agricultural land as a last resort. Hopefully, these measures would help women farmers (Biswas 2011).

Given that land and nutrition are interconnected, the GOI has also launched the draft of the Indian National Food Security Bill. The Bill seeks to legitimize food security as legal rights and bring together several existing and new social protection initiatives. It includes a wide range of benefits for mothers - including take-home rations, cash grants and breastfeeding counseling. To distribute cheap grains, it also details systemic reforms

to revamp the rickety PDS. The bill also has a few gems to remedy the crisis in Indian agriculture: it promotes minimum support prices for small farmers across states and the production and consumption of nutritious coarse millets. The most promising proposal of all is the creation of an administrative cadre across India's 627 districts with a single focus - to monitor food schemes and redress grievances (guardian.co.uk).

According to Krishna (2007), gendered governance would help to promote further the necessity of participatory development and to view women's right to life or 'livelihood as a political right to dignified living rather than simply as a welfare (socio-economic) need,' (6). NGOs are an important part of this governance. Women's NGOs like SEWA (self-employed women's association) helps by providing social capital and resources that help to bridge structural holes in women's networks. NGOs like the Honey Bee Network (Gupta, 2005), the Chipko movement in Northern India (Gupta, 2008) and the Rawain Women's Cooperative Federation (Sati and Juyal, 2008) have helped successfully market the benefits of traditional knowledge through lateral learning, increase economic empowerment of women through micro-enterprises, and reduce ecological degradations in villages. Such movements have also ensured women's participation in policy making, community based interventions and institutional support. Such activities ensure that a proper knowledge society emerges from knowledge rich but, economically poor individuals and communities.

According to Ghosh and Ghosh (2011) corporate houses and NGOs in India have cooperated for inclusive growth. They have cooperated in management of agricultural organizations, such as Krishi Vigyan Kendras (agricultural learning centers); and

collaborated on action research, extension, marketing and promotion of collectives. The fields that they have collaborated in include organic farming, systems of rice intensification (SRI), low-cost drip irrigation, participatory technology, development that takes into account farmers' traditional knowledge, and use of information technology for integration of marketing channels. For example, the NGO Professional Assistance for Development Action (PRADAN) has been involved in SRI experimentation in West Bengal. In Maharashtra, the NGO Gomukh Centre for Rural Sustainability helps organic farmers by facilitating delivery of their products to the customer's doorstep. E-choupals or information kiosks introduced by the Indian Tobacco Company is increasingly becoming prevalent across India in helping small and marginal farmers access knowledge of weather, price, technical know-how of farming, and customer information like customer preferences. According to Ahmed (2011), CSR activities of 300 corporate houses in India has spread across 20 states and Union territories, with Maharashtra gaining the most from them.

NGOs help in many ways but, outcomes depend on the reality on the ground. For example, NGOs such as Myrada and DHAN Foundation help with micro-credit schemes for self-help groups (SHG). But, according to Kilby (2011), such schemes tend to be inherently limited as they tend to favor people with some assets, usually land. The inequality in power relations in formation and operation of SHGs depend not only on class-issues of assets, but also on caste and religious and age issues, all of which means that microcredit may end up being sources of more indebtedness rather than sources of freedom (Arora and Romijn 2012). Moreover, SHGs empowerment significantly depends

on the ‘autonomous agency’ of the women involved in such SHGs. Such autonomy depends on the power to influence decision-making within the broader linked social capital within the village and the family; and land ownership or access that enables independent enterprises (Kilby 2011).

Overall, India’s new paradigm of agricultural development or neo-liberal development has had several negative effects (Sarkar et al. 2012). First, monoculture of rice, wheat and plantation crops have undermined biodiversity. Protein rich coarse cereals and pulses production have been going down as institutional support for its cultivation has gone down, and so has the demand for them especially since PDS buys and sells polished rice.⁵⁷ Second, overexploitation of water, soil salinity due to improper and excessive use of water, erosion of soil nutrients, growing pests’ resistance to insecticides, and dependency of farmers on all types of inputs have led to declining yields. Third, water logging in rice cultivation has caused a spurt in mosquito breeding and led to increased transmission and epidemics of vector-borne diseases such as Japanese encephalitis and malaria. Use of nitrogen fertilizers have also promoted the vector population and elevated nitrate levels in drinking water has raised significant health hazards. Fourth, working in fields, women have been exposed to major cut injuries from heavy machinery that can get infected without treatment, heat stroke, eye injuries, animal (snake and scorpion) bites, pesticide exposure and accidents. Women under such circumstances face both extremes of being extremely malnourished and being

⁵⁷ The authors’ study also found that women preferred to cook rice over coarse cereals because the former has fewer requirements for fuel; and women also had a sense of pride in having rice as a regular meal even though it was not as nourishing as coarse cereal.

overweight, with the latter being due to higher consumption of fat in the form of carbohydrates, oils and salty foods. Overweight leads to higher incidences of diabetes, hypertension and ischemic heart disease.

The agricultural situation in India is dire. Yields have been falling and unemployment has been increasing. Land is a scarce commodity and women's food security is becoming precarious as women do not have control over land. The GOI and NGOs have been trying to provide some ameliorative measures for women farmers but, the situation for women is still dire. One of the best indicators of the deteriorating agricultural situation is the level of malnutrition and this is what is explored in the next section.

The Disconnect of Growth and Malnutrition in Maharashtra

Knowledge economy promises welfare along with growth. However, in India, growth has not been accompanied by welfare. This can be seen in high levels of malnutrition. Maharashtra is a sub-state that exemplifies this disconnect in India. It has high levels of growth as well as high levels of farmer suicides and falling levels of welfare. This section explores the growing lack of welfare through the lens of growing levels of malnutrition.

According to Pitre et al. (2009), Maharashtra has grown phenomenally in terms of economic growth. From an average of 5% per year from 1993-2001, growth increased to 7.8% from 2002-2007. The per capital NSDP almost doubled between the periods of 1996-97 and 2006 growing from Rs. 17,825 to Rs. 37,081. Between 1994-2008, the state's per capita income increased more than one and a half times. Though

Maharashtra's average per capita income is Rs. 30,750, among all districts, Greater Mumbai has the highest per capita income of Rs. 48,851, more than 60% of Maharashtra's average. But, in nutritional context the authors felt that this prosperity did not translate into welfare, since over the same period nutrition status has remained stagnant. In 1994, among 15 Indian states, Maharashtra ranked at 13th. In 2008, after 14 years, out of 17 states for which Indian State Hunger Index was calculated, Maharashtra ranked a mere 10 (as compared to a better rank of 8 for West Bengal). Maharashtra's Hunger Index Score placed it in the category of 'alarming hunger' on par with Orissa an economically less developed state whose NSDP is twice less that of Maharashtra at Rs. 17,610. Both Maharashtra and Orissa had for children under 4 years stunting around 45% and underweight around 40%. Maharashtra's NSDP is four times that of Bihar (Rs. 7,875). And yet, for women adults who were underweight, both states had similar BMIs, with Maharashtra at 34% and Bihar at 35%. These figures have to be considered against the background that over half of Maharashtra's population relies on agriculture and yet accounts for only 12% of Maharashtra's income.

Over one-third of all adults in the state are underweight with a BMI of less than 18.5 kg/m² and over 15% are severely underweight with a BMI below 17 kg/m². Almost 46% of women in rural areas are thin compared to 27% in urban areas. Nearly half the women are anemic because they consume half of the recommended daily allowances (RDA); and even 17% of men are anemic. National Nutrition Monitoring Bureau, in 2006 found that among adolescent girls of 12-14 years, the prevalence of mild anemia is 39.5%, moderate anemia is 17.8%, severe anemia is 0.5% and any anemia is 57.8%.

Among girls of 15-17 years the corresponding figures are 43.2%, 19.9%, 1.0% and 64.1%. Compared to India's average of 33%, 32.6% of Maharashtra women have a below normal BMI. Compared to India's average of 56.2%, 49% of Maharashtra's ever-married women are anemic. Compared to India's average of 58%, 58% of Maharashtra's pregnant women are anemic (ibid).

More than 50% of men and women in the lowest quintile of wealth in Maharashtra are chronically energy deficient and about one-quarter of adults are severely malnourished. On average pregnant women consume about 1500 kilo calorie or only 70% of RDA and one-third of the required amount of calcium and iron. 46.3% of children under-5 are stunted and nearly one-fifth are severely stunted. For children under 3, 40% are underweight, 38% are stunted, and 15% are wasted. 63% of children are anemic, with over 40% having severe or moderate anemia. Across religions 38% Hindus, 24% Muslims and 42% of Buddhist women are undernourished (ibid).

According to Pitre et al. (2009), since 1993, per day consumer unit calorie protein consumption has stagnated or declined. The entire coastal region of the state that has been booming from economic growth is home to 44% of Maharashtra's urban population, and yet, it accounts for 51% of the state's calorie poor. According to the authors, depending on the norm chosen, 54-68% of rural households and 40-58% of urban households are not getting enough calories. However, officially, only 30.7% of Maharashtra's population is classified as BPL based on an income rate below Rs. 15,000. This designation excludes over 16 million people who are too poor to afford adequate food. To rectify this miscalculation of stats, the authors use a per consumer unit calorie

norm of 2400 in rural areas and 2100 in urban areas. This revealed that the incidence of calorie-based poverty was 54.1% in rural areas and 39.5% in urban areas. The authors point out that even if official NSS norm of 2700 calories per consumer unit is considered then 68% of rural households are not receiving adequate calories and hence, should be considered 'calorie poor.' People who miss being classified as BPL cannot access BPL cards that would help them access rations from the PDS.

In 2004-05, among agricultural laborers the share of poor was 58.8% and among the self-employed in agriculture the share was 21.1%. Among the landless, the share was 47.7%, among the marginal landholders it was 24.2% and among the small farmers it was 14.5%. Even among the semi-medium and medium farmers the share of poor was 7.9% and 5% respectively. In 2004-05, based on the headcount ratio of poverty by social groups, in rural areas, STs accounted for 56.3% of poverty ratio, SCs accounted for 44.8%, OBCs accounted for 24.1% and 'Others' for 18.6%. The authors point out that a sampling of 80% of BPL households show that 42% of the households could not provide two square meals a day for all family members at some time or the other during the year. This figure is much higher than the 1% reported by NSS 2004-05. The authors also point out that the vulnerability of food insecurity was highest during the monsoon seasons. Monsoons forced households to migrate and this in turn forced them to forego governmental services provided in villages, such as mid-day meal schemes at schools.

Given the above scenario in Maharashtra, it is critical to make some interesting distinctions from West Bengal, a low to middle-income state. According to Pitre et al. (2009) protein deficient and calorie deficient households in Bengal accounted for 17.6%

and in Maharashtra they accounted for 26%. For protein adequate but calorie deficient, Bengal accounted for 33.3% and Maharashtra for 58.2% households. For protein adequate and calorie adequate households, Bengal accounted for 49% while Maharashtra accounted for only 15.8%. What is further interesting to note is that based on RDA levels of 460 grams, Bengal's average household consumption of cereals and millets was 477 while that of Maharashtra was 329. Compared to RDA levels of 40 grams of pulses and legumes, Bengal's consumption was 18 but, Maharashtra's was 33. But, in the most important criteria for iron intake, green leafy vegetables, compared to RDA of 40 grams, Bengal's intake was 41 while Maharashtra's was only 10. In the milk and milk products category compared to RDA of 150, Bengal had intake of 49, while Maharashtra had a much better intake at 77. In fats and oils compared to RDA of 20, Bengal had an intake of 18 while Maharashtra had an intake of 22. But, in the sugar and jaggery category, compared to RDA of 30, Bengal had an intake of 10 while Maharashtra had an intake of 29. Given the high fat intake in Maharashtra, the chances of obesity and NCD are higher than Bengal.

Despite being a fast growing state, Maharashtra's health profile does not paint a picture of welfare growing in tandem with economic growth. This disconnect shows that knowledge economy's predictions of growth and substantive welfare being achievable simultaneously is wrong.

Conclusion

Seed is the basis of sustaining human life. Patenting of seeds have opened up many negative impacts on farmers. Predominantly, there is loss of sovereignty or the

right to save, use and exchange seeds. MNCs have introduced GM seeds whose bio-hazards have not been explored very well (Alam 2011), and are not well-known to the common man. Seed dependency on MNCs has directly or indirectly brought about high rates of farmer suicides. This has contributed to further feminization of agriculture. Agriculture has become the step-child of the GOI and contra knowledge economy prediction patenting of seeds have led to neither growth nor welfare. With hardly any public support, the yield of agriculture, bio-diversity, employment have all been falling. Women are increasingly being trapped by poverty as they lack land, credit and market access and discriminated due to social norms of patriarchy. Improper management of agriculture have also contributed to health hazards of women. Some relief has been provided through gendered governance by NGOs. Maharashtra as a fast growing state demonstrates the classic disconnect between growth and welfare, especially nutrition welfare.

CHAPTER FIVE: CONCLUSION

This thesis has been attempt to show the disjuncture between growth and human rights and justice. The thrust on knowledge economy as a modality of growth has not brought about substantive equity for the poor in India. This has been primarily due to two reasons. First, empirically, the assumptions and the derivative systemic logic of the knowledge economy simply does not hold true.⁵⁸ Second, the neo-medieval nature of governance of India and the international system make it highly difficult to achieve human rights and justice.

India has been following the knowledge economy normative model of growth. In the international society of states this norm established by developed countries has been a strong influence on other developing nations who seek to emulate it even if it may not be the right path of development for them and they do not have the resources to mould their

⁵⁸ Neoliberal theory of knowledge economy is internally coherent as far as it is consistent with its assumptions, however, it is empirically not valid as it is not independent of a social context. Neo-medieval governance constitutes the socio-political context of any assumption being made. Socio-political contexts are fluid and overdetermined by multiple factors and hence, assumptions like perfect competition among mobile factors of production and equitable initial endowments of all actors are empirically simply not true.

economy in this path. Consequently, it is not surprising that many of the predicted outcomes of this model of growth simply do not pan out empirically.

There are multiple assumptions of the knowledge economy. Efficiency; perfect allocation of factors of production; pre-existence of uniform distribution of knowledge and hence, equity; non-diminishing returns of knowledge; protection of individual intellectual property rights or patents; free trade in goods and services are some of the key assumptions behind this model of growth propounded by neo-liberal economists. In this thesis there has been an attempt to show that such assumptions don't hold in empirical reality.

The case study of India is a springboard for the broader claim that such assumptions don't hold globally as well. For example, patents have failed to provide for access to medicine across the developing and less developed world of Africa (Comaroff 2007). The right to health is universally being trampled upon as free-market and free trade becomes the mantra adopted by the society of states (Forman and Kohler 2012). Such mantra of freedom essentially overlooks the initial condition of inequity that exists in the international system both at the state level and at the individual level. Such inequity handicaps all attempts to achieve equity merely through free trade as a modality of economic growth. Concurrently, with the state withdrawing from the public sphere in the face of the free market mantra, achieving human rights has become even more difficult. Without active political intervention human rights cannot be ensured. This critique has been made in the context of Latin America also (Boetsch 2005).

Knowledge economy as a universal grand theory tends to be dis-embedded from politics as a modality of governance of the international social system. In reality however, neo-medieval governance defined by overlapping authorities and tension between state and market due to their attempts to define modalities of growth and justice intervenes in the ideal scenario of free-market economy. This governance is defined by sharp inequity and a fight for human rights as *jus cogens*. Multiple actors with multiple interests fight for self-interest as well as altruistic justice. This is true not only for India as a case study but also for the international system as a whole. The fight for justice often lacks the mandatory rule-making power of the state and other international institutions. For example, instead of mandatory state regulations governing the activities of powerful corporations that function within the free-market, corporate behavior tends to be self-governed based on voluntary best practices code. This corporate social responsible behavior though claims to be concerned about human rights, in practice is overwhelmed by self-interested profit motives.

Systemically, market failure to provide for collective public services makes it extremely difficult to enshrine human rights as *jus cogens*. As state, the main bearer of the responsibility to protect human rights, withdraws from public sphere and unleashes free-market economy under the dictates of neoliberalism, human rights have become increasingly difficult to secure. This is because human rights are defined by issues of justice but free-market is motivated by issues of self-interest and profit that does not necessarily translate into welfare. Free market is driven by the rational greed of accumulation. Free-market is not a public institution driven by the motive of pure justice.

The main actors of the free market are increasingly corporate actors. These actors have enormous financial power to litigate to ensure their self-interest and have political power of lobbying to ensure that their interest gets primacy over issues of universal human rights. In the face of corporate power common citizens of the state stare at an uphill battle to ensure that human rights can be procured.

Despite the growing pre-eminence of unregulated market and unfettered greed for profit, the civil society has not quietly accepted the status quo. In the face of state withdrawal from provision of public services that ensure equity there has been increasing pushback from the civil society. This pushback takes the form of organized peaceful protest and even extreme militancy. This scenario is increasingly becoming common across the world as protests for human rights increasingly gain ground. This is not surprising as neoliberalism by dis-embedding the economy from the socio-political sphere of regulations triggers the double-movement of society predicted by Polanyi (2001). Such double-movements or countermovements of protest against social dislocation cannot be fixed through market principles and are in fact a response to the growing lack of social protectionism in the face of unleashing of a free-market economy. It is against the backdrop of this understanding that the thesis attempts to discredit the various assumptions and predictions of the knowledge economy.

The most critical way to disprove the thesis that knowledge-economy delivers welfare is to show that equity has not trickled down as growth has been non-inclusive. This is evident in the rise of poverty. India liberalized in early-90s with the hope of following the knowledge-economy model of growth. India was growing at 10% rate prior

to the economic crisis of 2008. Currently, its growth stands at 5% (The Economist 2013). Contra knowledge economy prediction, while India grew, its poverty rates increased. According to Joseph and Kang (2010), India ranks below Bangladesh on poverty. According to the Multidimensional Poverty Index (MPI), created by the Oxford University, India had a rank of 104 in terms of acute poverty. According to the MPI, India has 845 million MPI poor people, more than 26 Sub-Saharan nations put together.

Poverty has been rising in India. According to Satyanaryana and Srivastava (2007), over 800 million Indians still survive on Rs. 20 or US\$ 0.5 a day. This number of poor people is equivalent to the combined population of USA, Indonesia, Brazil and Russia. This vulnerable segment of the population comprising mostly of women and children under the age of 6 can barely afford the daily minimum calorie intake and other daily needs. Moreover, rural poverty has been rising. There has been a decline of the extremely poor (those with a wage earning of Rs. 9 a day) in the last decade from 37.7% (1993-94) to 21.8% (2004-05). But, the percentage of marginal and vulnerable population has actually risen from 51.2% (1993-94) to 55% (2004-05). According to Welshhoff (2006), in 2004, UNDP reported that 34.7% of India's population lived on less than \$1 a day and the population size increased to 79.9% if one included those who live below \$2 a day.

According to the World Bank, India has witnessed accelerated economic growth, progress on most Millennium Development Goals, and has emerged as a global player with the world's fourth largest economy in purchasing power parity (PPP) terms. However, poverty remains a major challenge (worldbank.org.in). According to Ravallion

and Chen (2008) of the World Bank, India is poorer than previously estimated in poverty figures between the periods of 1981-2005, but is no less successful in the fight against poverty. As per the revised estimates, the percentage of people living below the \$1.25 per day decreased from 60% in 1981 to 42% in 2005. Even at a dollar a day, poverty declined from 42% to 24% during the same period. The poverty has declined at a little under one percentage point per year. In 2005, 267 million people were living below a dollar a day, down from 296 million in 1981. However, the number of poor people living under \$1.25 a day has increased from 421 million in 1981 to 456 million in 2005. This indicated that there were a larger number of people living just above the 'poverty line' of a dollar a day and their numbers are not falling. These figures of 2005 were calculated based on PPP. India's PPP was estimated to be 40% of the market exchange rate, up from 23% in 1993. Hence, poverty levels measured against an international benchmark are higher in the latest global estimates.

According to newly revised 'official' poverty estimates of the GOI, poverty rate is at 37% (worldbank.org.in). According to Ghosh (2013), rural poverty measured in terms of headcount ratio declined significantly during the period from mid 70s to the late 80s, but increased again in the early 90s. From 55.4% in 1972-73 poverty declined to 34.4% in 1989-90. Then rural poverty increased to 35% in 1990-91 and then sharply to 44% in 1992. Though rural poverty increased after economic reforms but, the trend was moderated after that. The incidence of rural poverty based on the mixed recall period (MRP) in NSS consumer expenditure data declined from 27.1% in 1999-2000 to 21.8% in 2000-05. The estimate of rural poverty based on uniform recall period (URP) in NSS

data turned out to be 28.3% in 2004-05. In terms of interstate variations in rural poverty based on headcount ratio and URP, Maharashtra's poverty level was 37.93% in 1993-94 and 29.6% in 2004-05. Based on MRP, the level was lesser. For example, in 1993-94 poverty was at 23.72% and in 2004-05 it was at 22.2%. In the case of West Bengal, URP for 1993-94 was 40.80% and 28.6% in 2004-05. The drop in poverty was much more than that of Maharashtra. Based on MRP, rural poverty in Bengal was 31.85% in 1993-94 and 24.2% in 2004-05.

Ghosh (2013), and above mentioned other authors derive their figures from official data, but other scholars contest official interpretation. According to one current estimate, 80% of India's population lives on Rs. 100 or \$2 a day. This average daily budget enables a daily women laborer, depending on the part of India that she is living in and the cost of living in that place, to buy, for example, a kg. of rice for Rs. 27, vegetables for Rs. 10-20, fish for Rs. 25, ingredient to cook the fish for Rs. 10-15, and Rs. 25 for ingredients for breakfast. This income is hardly dependable. Since the income is erratic, the worker may sometimes get more than the average \$2 daily wage and sometimes no wage at all (www.theworld.org). Poverty is thus endemic to India.

According to Utsa Patnaik (2011), unemployment in both rural and urban areas has been increasing. Average food-grain absorption within the country, compared to the colonial period is at a historic low, even as food-grain exports are rising. The brunt of the resultant hunger is being borne by rural India. There is unprecedented agrarian distress manifesting in rural indebtedness, loss of assets, including land, and thousands of farmers committing suicide. Official figures claim a decline in rural poverty. These figures are

reproduced in the World Bank's World Development Report 2006. Such figures are misleading as they are based on logically incorrect methods of poverty estimation. Correct estimations demonstrate that poverty rate is high and poverty has been increasing in depth during the neoliberal period of economic reforms.

According to Patnaik (2011), the GOI's poverty estimates are fallacious. The estimates are no longer based on nutrition norms. Moreover, it takes into account an unchanged basket of commodities and costs of quantities consumed based on 1973-74 and simply updates it using a price index, the Consumer Price Index for Agricultural Laborers. This is done without reference to current data on actual cost of reaching the nutrition norm. The resulting 'poverty line' are gross underestimates of the current cost of living and give corresponding underestimates of the population in poverty.

According to Patnaik (2011), the official rural monthly poverty line expenditure for year 2004-05 is Rs. 356 per month or Rs. 11.8 daily, equivalent to 27 U.S. cents at the then prevailing exchange rate. This amount would buy at most 1 kg of the coarsest rice (not even so if one considers the high rate of current inflation). But, Rs. 11.8 is supposed to cover all expenditure on food, cooking and lighting fuel, clothing, shelter, transport, health and education, i.e. all required daily spending on goods and services of one person. The World Bank deflated the norm of US\$1.08 a day to the rupee equivalent of less than one-third dollar a day for India for that year, to adjust for PPP and thereby derived the national poverty of 35.3%. At this very low daily expenditure level, the nutrition norm recommended by the ICMR of 2,400 kilocalories of energy intake per person could not be accessed by India's villages. The actual energy intake according to the author's

estimate was 1,820 calories as an all-India average. The 2004-05 National Social Survey (NSS) data shows that at the all-India level, the rural consumer required Rs. 790 per month or over Rs. 26.3 per day to access the nutrition norm. The author's benchmark was more than double the official poverty line of Rs. 11.8 per day.

The skewed official analysis of the GOI delivers a poverty percentage of 28.3% in 2004-05. But, the NSS direct estimate of poverty reports that the percentage of people below 2,400 calories was 72% in 1973-74, rose slowly to 74.5% in 1993-94, and then steeply to 87% in 2004-05. Patnaik (2011), also considers percentage of people below 2,200 calories. She estimates that in 1973-74 poverty was at 56.4%, rose to 58.5% in 1993-94, and then steeply to 69.5% in 2004-05. By 2004-05, the proportion of persons consuming less than 2,200 calories had increased in 14 out of 15 major states in India. Hence, targeting the food subsidy using official measures leaves out over 300 million people in rural India who are in reality poor, but, are not officially recognized as poor. Inequity has thus been increasing alongside growth, and hence, growth in India has not been inclusive. The burden of poverty has also increased with the increase in NCDs that requires massive expenditure of resources for cure.

According to Gaihaa et al. (2010), going by the norms of 2100 calories for urban areas and 2400 for the rural, the proportions of calorie deficient populations has risen in both urban and rural areas over the period of 1993-2004. The rise was from 58% to 64% in urban areas and from about 71% to about 80% in rural areas. Consequently, at the all-India level, the calorie deficient population rose from about 68% to 76%. Moreover, the GOI has recently used lower calorie requirement of 1800 to count poverty, even though

adults are engaged in strenuous physical activity in rural areas and require higher calorie consumption. Using the higher calorie requirement of 2400, the authors find that over 71% of the rural households were calorie deprived in 1993. With the lower norm the proportion falls sharply to 31%. With the higher cutoff point, during 2004, the proportion of undernourished rose from 71% to nearly 80%. With the lower cutoff point the proportion of undernourished rose from 31% to 37%. This definitely implies an undercount of poverty-stricken people in India.

Gaihaa et al.'s (2010) data implies that there was considerable worsening of nutritional deprivation over a period of comprehensive macro-policy reforms and accelerated growth. The figures also represent an abysmal failure of anti-poverty programs of the GOI, such as the MGNREGA, to correct nutritional deprivation and inequity. Inequity according to the authors has also been contributed to by rising inflation and food prices. For example, between the period of 1993-2004, cereal prices rose by 58% and vegetable prices close to 100%. Inability to account for such changes means that official estimates of poverty are way off-mark.

For Gaihaa et al. (2010) nutritional intake has a critical effect on labor productivity and wage rates. At low nutritional intake, workers are physically incapable of doing hard manual labor. This in turn means they get low wages, have low PPP and therefore low levels of nutrition. This completes a vicious cycle of deprivation. Moreover, the workers are unable to save much. Their assets, both physical and human are minimal. This reduces their chances of getting out of what is called the poverty-nutrition trap (PNT). PNT is worsened by any mild labor shock, such as those associated

with crop shortfall. Specifically, female workers would be more prone to PNT than male workers, since there is a persistent gender inequality in rural India. The authors' study revealed that women PNT held with regard to both harvesting and sowing wages. The scourge of food price volatility and food scarcity also worsens PNT. Hence, PNT has long-term welfare consequence. But, most critically, poverty and inequality for female-headed households are a full 20% higher than national average (Kilby 2011). Given the severe poverty problems in India, it is not surprising that India ranks an abysmally low 119 out of 169 countries in UNDP human development index.

According to Walker (2009), at the end of 2006, 42% of Indian children suffered from malnutrition, 80% suffered from anemia and 48% were stunted. NSS data shows that the percentage of undernourished rural households rose from 48% in 1988-89 to 67% in 2001-02. Since 2002 the situation has been worsened due to population growth overwhelming declining rates of growth in food production. In 1993-94 the average consumption of cereals for rural households stood at 13.4 kg. By 2005-06 it had declined to 11.9 kg. This is a sure sign of rising malnutrition.

With the rise of neoliberalism and an emphasis on knowledge economy and service sector, the agrarian sector has been in crisis. Rural poverty has been on the rise and at the same time pro-poor public policies have taken a hit. For example, under neoliberal dictates Public Distribution System (PDS) that provides the poor with cereals at subsidized prices has increased its prices. This led to the poor to cut their consumption and led in 1995 to the first episode of many, of the government being left with 32 million tons of unsold PDS food stocks (by 2002 the buildup was 64 million tons) and eventually

rotting food. Inefficiencies continued as by 2004-05, 58% of PDS stock did not go to those labelled 'officially' as below poverty line and 36% was lost to 'black market' (Walker, 2009). Thus, under knowledge economy dictates inefficiency and poverty has increased. Poverty is hardly conducive to development of an 'intellectual economy' since it prevents development of capabilities through factors like daily sustenance that ensures healthy brain development and good education. It is with this background in mind let's look at the chapter summaries.

The first chapter deals with the social constructs that are critical for this study. These include neo-medieval governance, knowledge-economy, CSR, biotechnology, gender, nature of the Indian state and the figures and models that depict their interrelationship.

The second chapter looks at the disjuncture between the store of knowledge among the poorest of the poor - the STs - and their (including women) dire state of health. Tribal people have vast stores of knowledge as is apparent from various field-studies done by authors about their knowledge for curing diseases through plant and animal extracts. However, they cannot cultivate this knowledge and produce radical or incremental innovations due to lack of patent protection that make them vulnerable to biopiracy and due to lack of access to resources, particularly forests and land in general. Forests provide sources of NTFPs. Land is needed to cultivate medicinal plants and crops. Knowledge economy cannot account for how initial inequity in resource distribution handicaps the growth of knowledge.

The GOI claims that it is protecting the forests for conservation purposes and labels the STs as illegal encroachers. The GOI claims to conserve the forests in a more scientific manner. Ironically, it fails to delegate the preservation of forests to those with the maximum knowledge to preserve it. The GOI fails to recognize the social dimensions of knowledge where knowledge rests in relational 'trust' networks of a community. With knowledge economy reigning supreme, knowledge is only seen in functional, commodified, objectified, measurable, transferable and individual terms. When community based knowledge is overlooked in favor of commercially exploitable knowledge, knowledge denudes over time. This is contra knowledge economy predictions of non-diminishing nature of knowledge.

The GOI also takes over forests for national and public purposes, such as mining. This commercialization of forests also leads to dispossession of tribal people from their ancestral lands. Dispossession also leads to denudation of knowledge and contributes to growing poverty. It is also a clear signal that in knowledge economy where commercial interests reign supreme, the powerless are increasingly losing property rights (over land) instead of gaining them. Thus, the GOI's notion of growth and justice fails to deliver welfare to the tribals.

There has been ongoing struggle between the GOI and Maoist rebels, who claim to represent the STs, over dispossession of STs from their customary right to forests and their lands. This is a result of increasing democracy deficit as the state seeks to deprive the STs in favor of market development of land and forests. Social development of STs is severely hampered under such a situation. Instead of empowering the socially oppressed

as per a social compact, the state has sought to unleash a free market economy that disempowers the socially deprived.

Knowledge economy visualizes an auto-regulated asocial market as the key to provision of democracy. In such a market atomized agents fulfill their rational greed through asocial interaction and thereby ensure that individual will is achieved. However, democracy is a matter of collective responsibilities and democracy provision is thus the realm of a public institution like the state. Increasing state retrenchment from provision of welfare has led to increasing contestation over democracy. The Maoist rebels claim the responsibility of providing welfare that should essentially be provided for by the state. This militant struggle has increased anarchy rather than provision of peace and equity. Knowledge economy does not anticipate such civil society resistance that can denude democracy.

The tribal situation is worsened by the stealth of tribal knowledge or biopiracy by foreign entities and corporations. Knowledge economy with a contradictory vision of justice based on greed cannot account for such violations of tribal rights by corporations. Voluntary corporate best practices have not succeeded in preventing such acts of greed. An unregulated free market has thus proved to be detrimental to deliverance of welfare.

Due to overall development failure, and lack of access to forest resources which form their daily livelihood, STs suffer severely from health issues. Being afflicted by various kinds of diseases and poverty and malnutrition, the STs suffer severely on various measures of health, such as, malnutrition leading to low BMI. The dire state of tribal health in India is demonstrated by similar conditions in two sub-states - Maharashtra and

West Bengal. Maharashtra as an economically fast growing state has the same poor health outcomes for tribals as Bengal which is a middle to low income state. Unleashing a free-market economy has not led to better right to health and hence, better equity for the tribals. I propose that if the tribal people are given customized patents for their knowledge-communities they would be better able to monetize the value of their knowledge and preserve knowledge better. Customization of patents would better help to counteract poverty through benefit-sharing programs. Along with it, if they are given access to land they can conserve forests better.

The third chapter explores the outcome of government withdrawal from provision of services, the unleashing of free-market, and the results of provision of protection of patents as a modality of growth and justice. The focus of justice here is good health outcomes through access to life-saving medicines. It is important here to remember that though the GOI has withdrawn from provision of services, under the Universal Declaration of Human Rights, it is supposed to have the primary responsibility of ensuring access to health or the right to health.

The chapter points out there have been growth in two biotech sectors of medicine. One is the traditional knowledge of Ayurveda and the other is the modern allopathic sector. In the former, the presence of the GOI is strong and patents have been acquired by public institutions of research. In the second, the market has a strong presence and monopoly patent protection has been granted to corporations. Neither outcome of growth has been beneficial for the poor. Patents continue to act as barriers to access to medicines. Most critically, there has been poor allocation of factors of production such that there is

very little research for the diseases of the poor and access to medicines for the poor, so that equity cannot be achieved. The poor do not have the resources to secure their right to health in the face of monopoly granted by patents.

Both the government and corporations have a mixed track record of trying to undertake ethically right measures of providing for access to medicines. The limited efforts made by the government have not made much of an impact due to its overall withdrawal from the provision of services. The provision of inefficient and corrupt public services was supposed to be overcome by provision of profit-oriented efficient private services. But, both public and private services are afflicted by corruption. The limited efforts made by corporations to provide free medicines are overcome by negative problematic activities undertaken by them. For example, corporations have made some effort to research for neglected and neglected tropical diseases, which are typically diseases of the poor. However, they also try to extend monopoly patent protection through evergreening activities. All such activities undermine the human right to health. The promise of efficiency and equity as a result of adoption of knowledge economy has simply not panned out.

The poor in India cannot afford basic medicines due to high costs of patented medicines. Many fall into severe destitution in their attempts to provide for medicine through out of pocket expenditures. Hence, it is not surprising that poor women's health measures, such as, maternal mortality and life expectancy at birth is still very poor. Children in India have poor track record of being severely undernourished and hence,

stunted, underweight and wasted. Under such conditions, contra knowledge economy predictions, efficient human capital cannot be formed.

A thriving biotech sector and overall growth in the pharmaceutical sector has not translated into substantive equity for the poor in India. Contra predictions of the knowledge economy, economic growth has not translated into substantive equity through trickle-down effects. Poverty continues to exist at high levels during times of economic growth. Along with poverty, the poor are burdened with the double whammy of communicable and non-communicable diseases. India is going through an epidemiological transition where developed country diseases, such as, cancer, diabetes and heart diseases are afflicting the poor. This situation is worsened by state retrenchment from provision of services for the poor and undercounting of poverty.

In case of lifestyle diseases, hospitalization is the main concern for a sick patient. However, the infrastructure of hospitals in India is very poor. Most hospitals are concentrated in urban areas, beyond the immediate reach of the rural poor. On top of that public hospitals have poor service. Private hospitals are often beyond the reach of the poor even though many such hospitals by adopting a public-private approach are supposed to provide for the poor. Contra knowledge economy predictions, the development of private sector to compensate for the inefficiencies of the public sector has not resulted in better equity for the poor. On top of that the poor has to expend out of pocket expenditures to take care of their health by buying expensive medicines. Such expenditures drive the poor into further destitution. Free-market economy in health has thus not provided for better equity for the poor.

The fourth chapter deals with the increasingly problematic aspects of patenting of ‘natural’ goods like seeds. Women farmers have been selecting, saving and using best seeds for millennia. Seeds, particularly food crop seeds, have been the store of women’s knowledge for generations. The private breeders industry have been developing biotech seeds and claiming patents on seeds. Such patents act as barriers to women’s ability to cultivate seeds and food and cash crops of their choice. This leads to loss of knowledge, which also causes food insecurity.

The situation in agriculture is worsened by patriarchy. Under free-market conditions, technology adopted such as Bt technology for cash crops or cultivation through contract farming are increasingly the domain of men. Women do not have a say in cultivation of Bt seeds such as Bt cotton and they are least likely to be chosen as contract farmers. This is significantly due to lack of effective control over land by women. The situation holds true even though there has been growing feminization of agriculture. Knowledge economy cannot account for patriarchy acting as a distortion on free-market activities.

Patriarchal dominance in agriculture has been co-characterized by failure of Bt cotton cash crops and rising suicides by male farmers. Women under such conditions are left destitute. The civil society has increasingly pushed back through peaceful protests over such conditions. The civil society including NGOs like Navdanya has successfully prevented the introduction of Bt seeds into food crops such as brinjal or eggplants. They have done so by pointing out many harmful effects of Bt seeds.

The GOI has been increasingly focused on growth of service activities and the reduction of agriculture as a focus area of growth. This is because knowledge economy promises a shift to higher productive activities from subsistence activities like agriculture. However, the GOI has failed to reduce poverty which pushes people into subsistence activities. Moreover, it has failed to shift a huge portion of the population from physical activities of agriculture to intellectual activities of service through overall development. Thus, despite knowledge economy adoption, a huge portion of the Indian population continues to be involved in agriculture. Women's condition in agriculture is worsened by unemployment and caste discrimination, a situation unaccounted for by knowledge economy. Under such conditions it is not surprising that rate of growth of agricultural yields have been falling and starvation scenarios and farmer suicides have been increasing (Walker 2009). Concurrently, there has been a deficit in overall welfare for women.

The situation of women has been sought to be alleviated by NGO activities that seek to form cooperatives, help women with micro-enterprises and so on. But, nonetheless the situation of women is still dire. NGOs do not have true freedom of activity in India as they are over regulated to prevent them from becoming politicized.

Finally, Maharashtra a fast growing sub-state in India is a classic example of the overall disconnect between knowledge economy growth and equity. Maharashtra has had high growth rate and high levels of farmers' suicides. It has a high Hunger Index Score compared to some of the more backward states in India like Orissa. Malnutrition and its

accompanying outcomes such as stunting and wasting remains a major problem for Maharashtra.

All of the above outlined problems with knowledge economy mean that it is a negative normative model of development. The GOI needs to take care of the agricultural sector, reduce graft, and ensure more and better delivery of services to the poor. Simply initiating programs like the MGNREGA or the Food Bill is not sufficient in the scenario of neo-medieval governance where issues of caste and patriarchy leads to discrimination against women and act as a barrier to access of public services. The state needs to actively intervene to ensure the welfare of women. Such programs are also increasingly becoming difficult to sustain as the economic condition of India is deteriorating (The Economist 2013).

The GOI needs to find a new modality of development in order to face the multifaceted problems of civil society pointed out in this thesis. It needs to engender governance to improve the lot of poor women in India. The multilateral society of states has to come up with better and nuanced solutions to the problem of development taking into account local social structures and history. It should amend the TRIPS to provide for customization of patents to protect vulnerable women's knowledge.

Future Directions of Research

This study has been done through secondary resources. Future research could try to look into the issues raised here through primary research. Studies could look into issues of tribal welfare and integrate them into notions of failure of knowledge economy. Similarly, studies could look into issues of NGO activities, their success and failure in the

face of neo-medieval governance and an increasing thrust towards knowledge economy. Civil society associations, such as, NGOs are shaped by dynamic societal forces that allow individuals broader opportunities to coalesce with like-minded others around common issues and needs to promote collective action. They are an alternative to statist and market forces because the bonding agent of social capital creates incentives for long-term reciprocity among the collective actors. NGOs by having this strength can overcome collective action problem and provide effective voice to needs that are ignored by the market, and needs that cannot be served by weak, resource-strapped or repressive government regimes (Teegen et al. 2004).

This study is a case study. Future research on case studies of other countries, particularly developing and less developed country could bring out the problematic aspects of knowledge economy. It would help validate further the points made in this study. So far, this study is unique in terms of being a country-study and the study of effects of knowledge economy across the country in two issue-areas - pharmaceuticals and agriculture. Majority of studies done on knowledge economy has been done in the field of education. International relations as a field of knowledge has serious gap in tracing the impacts of knowledge economy. To that extent this study is a serious effort in understanding the impact of knowledge economy on welfare of state citizens.

This study could also be theoretically extended by incorporating Foucault's account of governmentality. Foucault has pointed out that neoliberalism as a knowledge discourse creates a reciprocal constitution of power techniques and forms of knowledge. In that sense neoliberal 'governmentality' has two components:

On the one hand the term pin-points a specific form of *representation*; government defines a discursive field in which exercise of power is ‘rationalized.’ This occurs, among other things, by the delineation of concepts, the specification of objects and borders, the provision of arguments and justifications, etc. In this manner, government enables a problem to be addressed and offers certain strategies for solving/handling the problem. On the other hand, it also structures a specific form of *intervention*. For a political rationality is not pure, neutral knowledge which simply ‘re-presents’ the governing reality; instead itself constitutes the intellectual processing of the reality which political technologies can then tackle. This is understood to include agencies, procedures, institutions, legal forms, etc. that are intended to enable us to govern the objects and subjects of a political rationality (Lamke 2001: 191).

In essence, governmentality refers to the way governments try to produce the citizen best suited to fulfill its policies and as well as to the organized systematic practices through which the subjects are governed. Future studies could look at the play of knowledge and power through Foucault’s lens in order to understand the growing negative impact of free-market neoliberal economics.

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