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Policy development and implementation - Maternal health in India

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ABSTRACT

Background: The progress to improve maternal health in India is characterized by a wide spread of success stories as well as failures. Policies and programs have been developed and implemented to reduce maternal mortality; however, many women stil lack access to health care during pregnancy and delivery and approximately 68 000 women die in pregnancy related complication each year. The capacity of the health system in India is considered to be weak and this is likely to influence the access to and use of maternal health care services.

Aim: The overall aim of the work presented in this thesis was to explore and describe the topic of maternal health policy in the context of India, focusing on the states of Madhya Pradesh and Gujarat.

Methods: To approach the topic of maternal health in India both qualitative (paper I) and quantitative (paper II) methods were used. In paper I, the implementation of maternal health policies in the state of Gujarat were explored by conducting in-depth interviews that were analyzed using qualitative content analysis. In paper II, a prospective cross-sectional design was used to study how antibiotics were prescribed during vaginal delivery and cesarean sections in a hospital setting in Madhya Pradesh.

Main Findings: The findings presented in paper I indicate that limitations in the health system have implications for the capacity to implement maternal health interventions in Gujarat. Findings presented in paper II, show high levels of antibiotic prescribing during vaginal delivery and cesarean sections during hospital stay and at discharge.

Conclusions: Improved maternal health is dependent on good policies and the functioning of the health systems. To further strengthen the capacity of the health system to implement maternal health policies in the state of Gujarat the findings presented in paper I indicate that improved coordination between actors and between single interventions, long-term and improved monitoring systems are key factors essential to strengthen capacity. To ensure evidence-based practice in terms of the prescribing of antibiotics during delivery in health facilities the development of a policy providing guidelines on best practices is important.

LIST OF PUBLICATIONS

I. Paper I. Linda Sanneving, Asli Kulane, Aditi Iyer, Bengt Ahgren. Health system capacity: maternal health policy implementation in the state of Gujarat, India. Global Health Action 2013;6:19629

II. Paper II. Megha Sharma*, Linda Sanneving*, Kalpana Mahadik, Michele Santacatterina, Suryaprakash Dhaneria, Cecilia Stålsby Lundborg. Antibiotic prescribing in women during and after delivery in a non-teaching, tertiary care hospital in Ujjain, India: A prospective cross-sectional study. (Accepted for publication in the Journal of Pharmaceutical Policy and Practice)

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TABLE OF CONTENT

LIST OF ABBREVIATIONS

ANC	Antenatal Care
ATC	Anatomical Therapeutic Chemical
CHC	Community Health Care center
DDD	Defined Daily Dose
EmOC	Emergency Obesetric Care
FRU	First Referral Unit
GDP	Gross Domestic Product
HPSR	Health Policy and Systems Research
ICPD	International Conference on Population Control
LMIC	Low and Middle Income Country
MDG	Millennium Development Goal
MMR	Maternal Mortality Rate
NFHS	National Family Health Survey
NGO	Non-Governmental Organization
OBC	Other Backward Castes
PHC	Primary Health Care center
SBA	Skilled Birth Attendant
SC	Scheduled Caste
SRHR	Sexual and Reproductive Health and Rights
SRS	Sample Registration System
ST	Scheduled Tribe
TB	Tuberculosis
TBA	Traditional Birth Attendant
WHO	World Health Organization

INTRODUCTION

GLOBAL AGENDA ON MATERNAL HEALTH

'Every four hours, day in, day out, a jumbo jet crashes and all on board are killed. The 250 passengers are all women, most in the prime of life, some still in their teens….' (WHO 1986)

With these strikingly illustrative words, the global crisis of maternal deaths was put into perspective at the WHO Interregional Meeting on the Prevention of Maternal Mortality in 1986[1]. Thirty years later, the world has experienced both successes and failures in improving maternal and reproductive health. Globally, the maternal mortality rate (MMR) fell from 400 deaths per 100 000 live births in 1980 to 260 in 2008 [2,3]. The progress achieved is, however, unevenly distributed between regions in the world and between nations. Countries such as Thailand, Malaysia, Honduras and Egypt have all reduced MMR significantly in the past decades [4], while little or any progress can be seen in a number of countries in sub-Saharan Africa [5]. Ninety-nine percent of all maternal deaths occur in low and middle income countries (LMIC). However, the largest disparities is perhaps the difference between groups within countries, with poor and rural women being less likely to have access to maternal health care services than non- poor, urban women in any country [6-8] .

To improve maternal and reproductive health globally requires a shift in focus, where research and policy moves beyond the medical perspective and approach maternal and reproductive health as a social phenomenon as much as a medical event [9]. The International Conference on Population and Development (ICPD) held in Cairo in 1994 was an important step in this direction. The conference meant a shift in focus away from population control towards reproductive health rights for both men and women. The Program of Action of the conference argues that population growth can be stabilized while meeting reproductive health needs of individual men and women [10]. The Program of Action was controversial in advocating for reproductive health rights but has been influential when formulating global and national policies and programs. It states that empowering women and improving their political, social and economical status is crucial not only for their own health and wellbeing but also for the success of population policies.

In the turn of the century, 189 countries agreed to work towards achieving progress on improving the health and wellbeing of people worldwide. The Millennium Summit in 2000 was one of the largest gathering of top leaders of the world and the Millennium Declaration adopted at the summit formulated a global partnership to reduce extreme poverty. The goals were organized into eight focus areas, referred to as the Millennium Development Goals (MDGs), with defined indicators to monitor progress for each goal [11]. The fifth goal is dedicated towards improving maternal and reproductive health globally [12]. The goal is divided into two targets, the first is to reduce MMR by three quarters until 2015 and the second is to achieve universal access to reproductive health. The second target was added a year after the first, and the concept of reproductive health was much debated. Promoting and providing abortion care and contraceptives is

in many settings still controversial, as is the concept of sexual and reproductive health rights (SRHR). Women's right to their own bodies remains a provocative standpoint in many contexts and decisions regarding family planning and care seeking during pregnancy is often considered to be an authority of the husband or in-laws. The fifth MDG is considered to be an important benchmark for maternal and reproductive health on the global agenda. Yet, it is also criticized for being rhetoric's rather than an action point. The global MMR in 2010 was 210 maternal deaths per 100 000 live births, down from 400 maternal deaths per 100 000 live births in 1990 [13]. These estimates indicate that it is likely that the MDG 5 will fail in reaching its targets globally by 2015.

MATERNAL HEALTH DETERMINANTS

The multifaceted nature of maternal health demands a wide range of complex and comprehensive interventions to achieve progress in reduction of maternal mortality [14]. The complexity composes partly of that there are several possible complications and partly due to each of these complications being dependent on several single interventions to prevent death. Even the most common cause of death postpartum hemorrhage, extensive bleeding, requires a wide set of complex interventions to be prevented from occurring. This means that the effectiveness of a policy with the objective of improving maternal and reproductive health is dependent on the effectiveness of a package of interventions. It also means that the objective of the policy is highly dependent on each intervention to be achieved. This makes maternal health greatly dependent on the capacity of health systems.

A maternal death is usually defined as a death occurring up to forty-two days after delivery and most deaths occur between the third trimester and the first week after delivery [15,16]. The causes of maternal deaths are well known medically speaking, and a vast majority of all deaths can be prevented with available interventions . Severe bleeding, hypertensive diseases and infections are the main causes of maternal deaths [17], exact figures on the prevalence of each cause is difficult to estimate since most deaths occur in homes rather than at health facilities and due to that many countries lack systems for reporting maternal deaths [18]. Where nothing is done to avert maternal death, the magnitude of maternal mortality is estimated to be around 1500 deaths per 100 000 live births [19]. Most high income countries have achieved a MMR around 5 deaths per 100 000 live births, while MMR remain high in many low and middle income countries (LMIC). There is little doubt that poverty contributes to high levels of MMR, however, wealth does not explain everything. Countries with similar Gross Domestic Product (GDP) can vary significantly in levels of MMR and there are examples of reduction in MMR independently of reduction in poverty [19]. Recent figures from the United Nations (UN) show that among 87 countries who had an MMR above 100/100 000 live births in 1990, 51 countries achieved a reduction with 40% and above by 2008, illustrating the possibility to reduce MMR even in resource poor settings [20]. This lends strong support to the opportunity of reducing MMR by not only targeting economic development but also focusing on the implementation of policies containing evidence-based interventions. The reduction from levels above 1000 deaths per 100 000 live births in former LMICs and present LMICs achieved with available interventions, show a similar effectiveness in reduction of mortality as undisputable public-health interventions such as polio immunization [14].

Knowledge in terms of when most deaths occur and what causes a majority of them has implications for how policies should be developed and implemented in order to prevent mortality. Access to health care during delivery is recognized as the most important factor to achieve reduced maternal mortality [21]. It is during delivery most of the fatal complications arise. Most of these complications cannot be predicted or prevented [22,23] , making it particularly important for policy objectives on maternal health to provide interventions ensuring access to intrapartum-care. Where women delivers, who is assisting her, equipment and supplies available, and the functioning of referral systems are crucial in preventing maternal deaths [24]. Evidence available indicate strong support for women to give birth supported by a skilled birth attendant (SBA) in combination with referral system ensuring access to basic and comprehensive emergency obstetric care (EmOC) such as cesarean section and blood transfusion (Campbell. Strategies for reducing maternal mortaliry…). However, maternal health is multifaceted and important achievements can be made through interventions implemented as a part of the primary health care [25]. Interventions, such as family planning interventions, can be influential in providing access to contraceptives used to space or limit numbers of births, which has been shown to be associated with maternal mortality. Interventions on maternal health are often also dependent on the community for their success [26]. Several studies suggest that community health workers play an important role in promoting the use of health care services during pregnancy and delivery and mobilizing the community in efforts to reducing maternal mortality [27-29] .

Different approaches to policy on intrapartum-care have been advocated for in the past decades. WHO advocates for 'skilled care at every birth'. Ensuring skilled care requires adequately trained and accredited health personal, such as midwifes, doctors or nurses who have been trained to manage normal and uncomplicated pregnancies, childbirth and the immediate postnatal period, and to identify complications in women and newborns and to manage referral in such cases [30]. Skilled attendants conducting normal deliveries at home have been promoted to increase access of care during delivery for women living in remote areas [31], while others dismiss this strategy due to limitations in referral systems in case of emergency. The same argument is presented against strategies focusing on strengthening the knowledge and skills of traditional birth attendants (TBA) [32]. Other argue that the key is to implement what we know works through all available and possible channels [33]. In a review of evidence from countries considered to be successful in reducing maternal mortality, including Egypt, Honduras, Bolivia, Indonesia, Jamaica, Zimbabwe and the Yuannan province in China, two factors common for all countries are identified [34]. The first factor is high availability of health professionals that are either a SBA or closely connected with a strong and reliable referral system. The second factor is high availability of facilities that can provide basic and essential EmOC.

Case studies have shown considerable diversity in terms of interventions that contribute to a decline in MMR [35]. Among countries that have achieved progress and reduced MMR from high levels to below 100/100 000 live birth different policies have been implemented. In Cambodja interventions to increase the proportion of deliveries conducted by a SBA targeting both demand and supply side were implemented [36]. Bolivia and Gambia have implemented interventions targeting financial barriers to

maternal and reproductive health care [37] and in Morocco and Bangladesh effort have been made to strengthen access to family planning [38,39].

A study looking at a wide range of interventions in sixty-eight countries, within which ninety-eight percent of all maternal deaths occur, show that there are great variations between the implementation between type of intervention [40]. Interventions that can be routinely planed and administrated, such as antenatal care (ANC), had a much higher coverage than interventions dependent on the availability of services around the clock, such as basic and comprehensive EmOC. The review also showed that there are great variations in implementation between countries. Additionally, examples from countries successful in improving maternal health, highlights the need of a wide spectrum of both medical and social interventions to achieve progress. Egypt is an example of such country, where the MMR dropped by 52%, from 174 to 84/100 000 live births between 1992/93 and 2000 and where the wide spectrum of interventions has been identified as a key to success [41,42].

HEALTH POLICY AND HEALTH SYSTEMS

The work presented in this thesis is centered around the concepts of health policy and health systems. Health policy and health systems are dependent on each other to achieve improved health. To be successfully implemented policy is dependent on the capacity of the health system, and for the health system to ensure access to evidence based, high quality care it is dependent on good policies.

Public policy – what is it?

The concept of policy usually refers to a public policy. There are several different definitions of what a public policy is and how it should be studied. Most definitions, however, agree that public policy is a result of a decision taken by a government, and that the decision taken by a government to retain status quo is just as much a policy as if a decision to take action would have been made. The best known, and perhaps the most cited definition of public policy, is the definition provided by Thomas Dye. He defines a public policy as 'anything a government chooses to do or not to do'[43]. When scrutinized, this definition is too simple since it in practice would mean that every decision taken by the government, from the decision on installing a coffee machine in the lunchroom to the decision on taxes, would qualify as a public policy. A somewhat more precise definition is provided by William Jenkins, who defines public policy as a 'set of interrelated decision taken by a political actor or group of actors concerning the selection of goals and the means of achieving them within a specific situation where those decisions should, in principle, be within the power of those actors to achieve' [44]. This definition adds on Dye's definition and points to several important features of public policy. One of the important points made by Jenkins is that a policy should be considered a process rather than a product, a process containing a large number of decisions taken by a several actors at different points in time. A third definition often cited is provided by James Anderson, who describes policy as a 'purposive course of action followed by an actor or a set of actors in dealing with a problem or matter of concern' [45] . This definition adds a problem-solving aspect to policy-making, where the actions of governments are linked to the perception of a problem or a cause of concern that requires action.

Regardless of which definition used to define the concept of public policy, it can be said to be a complex phenomenon. It generally involves many actors or groups of actors and decisions are often both linked to previous decisions taken and to decisions where the association may not always be clear. To make studies on public policy feasible, models have been developed to simplify the policy-making process by dividing the process into stages. These types of models are often referred to as policy cycles. This way of breaking down the policy-process into stages was first introduced by Lasswell, who divided the process into seven stages [46]. This early model of a policy-cycle was focused on the process of decision-making within governments and did not take into account the context in which decisions were made. Laswell's ideas were further developed by adding the recognition that a policy process is an ongoing cycle where different stages are closely interlinked with each other [47]. More recent developed models also takes into account the influence on context on the policy-making process. [48,49] . In the early models of policy cycles this was not only used as a mean to make studies of policy feasible, it was also considered as an ideal way of organizing policy-making. Among present scholars, models of policy cycles are primarily used as an organizing framework for the study of policy [50]. The policy cycle perceives policy as a continuum in which an interactive and negotiate process is taking place over time, at different levels and between different actors, or as Anderson expresses "policy is being made as it is being administrated and administrated as it is being made" [51].

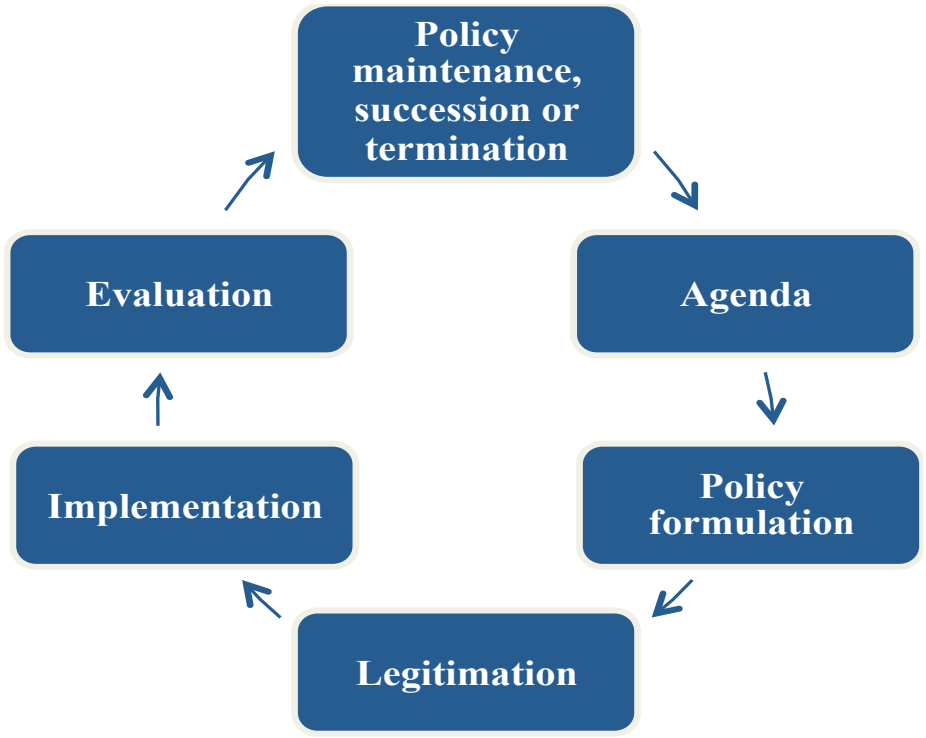

Figure 1: The policy cycle

The studies presented in this thesis use what Cairney calls a generic policy cycle to conceptualize the concept of what a policy process is. Public policy is complex, untidy and often unpredictable and by simplifying the policy process some of the features of the process is lost. Most scholars argue that a simplification is necessary and that accurate knowledge can be generated through research conducted despite that some of the complexity is lost. The trade-off between simplifying to increase feasibility and the lost complexity is a judgment all researchers set out to do policy science needs to consider. In the work within the frames of this thesis, this is a question that have had to consider and re-consider at different stages of my research.

Health Policy and Health Systems – a conceptual framework

Health policy is simply a policy concerning health. The concept is used for both public and private policies, and sometimes in an even broad sense than this, but in this thesis health policy refers to a public policy. Health policy is, just as a public policies in general, closely intertwined to the context in which they are formulated, administrated and implemented. Buse et al (eds) describes health policy as being 'inextricably linked to politics and deals explicitly with who influences policy making, and how they exercise that influence under different conditions [52].

Studies on public policy are often conducted to understand how and why decisions are made or not made throughout the policy cycle. Questions on how and why can be approached in many different ways depending on the perspective used when studying this cycle. The focus can be directed towards individual policy makers and their perceptions, believes and how recipient they are towards a specific issue. The focus can also be on the institutions and structures regulating the policy process. Health policy analysis is a multi-disciplinary approach, aiming at explaining the interactions between institutions, interests and ideas forming and defining the policy process [53]. The academic literature on studies conducted on health policy processes in low and middle income settings are scarce, and the focus of those conducted are often on 'what happened' rather than asking questions as to 'what explains what happened' [54].

The field of Health Policy and Systems Research (HPSR) is currently receiving increased acknowledgement as a way to approach health beyond medicine. The term HPSR emphasizes the important interactions between policy and health systems, and highlights the social and political nature of the field. HPSR is a multidisciplinary field, and different research traditions use different knowledge paradigms to approach research questions. Knowledge paradigms have implications for how objectives are focused and how they are approached methodologically. Traditionally, the field of medicine leans on a positivistic worldview while social sciences tend to take a more relativistic approach when studying society. Using the positivistic worldview, the starting point is that there is a single reality that can be observed and measure. The main focus of such research is to detect a causal relationship by using hypothesis and testing these on empirical facts. The main idea is that y will give x in any context. A positivistic approach to questions related to HPSR would for example focus on hypothesis such as 'limited financial incentives cause low motivation' or 'lack of health facilities undermines access to health care'. The relativistic worldview on the other hand, argues that the world around us is subject to human interpretation and health

policies and systems reflect this subjectivity. The focus of studies in HPSR based on a relativistic worldview could for example be on perceptions of actors on a specific health policy and which social and political processes, including power relationships, influences these actors [55-57] . This thesis will be based on a relativistic approach to health policy and systems, defining HPS as something that is constructed through human behavior rather than existing independently of them.

Academic discussions on how to study policy implementation have been ongoing since the early days of implementation research. Implementation research is a four-decade old field [58,59]; bedded in the field of social science. With time, however, the term 'implementation science' has evolved into different definitions and used in different ways depending on field of research. Within the field of medicine, and public health in particular, the interest in implementation research has emerged through the empirical observation that knowledge and technical development is not enough to prevent mortality and morbidity. Knowing what causes major killer such as Malaria, TB and most complications causing infant and child mortality is not enough to dispatch these complications as major public health challenges. Naturally, the focus of policy research within the field of public health has been focused on the gap between what we know and what is going on in the field. This gap has been referred to using terms such as implementation gap, the Know-Do gap and Knowledge Translation gap. These terms are sometimes used interchangeably and sometimes used to approach and discuss the different aspects of the gap. Much of the focus in regards to the gap in implementation has been focused on two issues: how to increase the uptake of research when developing policy [60-62] , and how to increase the adherence to clinical guidelines among health professionals [63-67] . The gap between what is known and what is done is in the work presented in this thesis approached by exploring the process of implementation (paper I) and by studying praxis in absence of an evidence based policy (paper II).

AIM

OVERALL AIM

The overall aim of this thesis is to explore and to describe the topic of maternal health policy in the context of India, focusing on the states of Madhya Pradesh and Gujarat.

SPECIFIC AIMS

I. To explore the process of implementing policies aiming at improving maternal health in the state of Gujarat, India
II. To describe the prescription of antibiotics during and after delivery in a tertiary hospital in the city of Ujjain located in the state of Madhya Pradesh, India.

INDIA: A COUNTRY OF CONTRASTS

AT A GLANCE

India, officially the Republic of India, is the seventh largest by area and second most populous country in the world.
Geographically, India is located in south east Asia and share boarders with Pakistan, Afghanistan, China, Bhutan, Nepal, Burma and Bangladesh. The landscape of the Indian subcontinent presents wide variation with snow-clad mountains in the north, deserts areas in the west, forests in the east and sandy beaches in the south.

Hindi, which is the language spoken by the largest proportion of the population, is the official language of the Indian government. However, each state and union territory has one or more official language. English is used when conducting buissnes or in governmental administration and most high education is taught in english. Hinduism, with around 80% of the population, is the largest religion followed by Islam, Christianity, Shikism, Buddhism and Jainism. Over the course of centuries, India has been invaded by a wide variety of cultures of different civilizations, shaping modern India into a pluralistic socio-cultural mosaic pattern.

India is considered as a rising superpower in terms of economic growth. There is growing middle class, with a high living standard. However, a large part of the population has fallen behind and remains in poverty. According to the Tendulkar Committee report, which the Indian Government accepted in 2011, the proportion of people living in poverty was estimated at 37% of the population [68]. However, there are large differences between different regions: in Delhi, Goa and Punjab the poverty level is below 10%, while in some states, such as Bihar and Orissa, the levels are above 40%.

Political context

In theories on the association between wealth and democracy India is often used as the exception. Despite expansive and widespread poverty, with 37% of the population being defined as poor, India has remained the world's largest democracy since its independence in 1947 [69]. Some argue that this partly can be explained by India being a federation, facilitating governing despite large areal and contextual diversities [70]. In India, the President is the head of state and the Prime Minister is the head of Government. The central government exercises its broad administrative powers in the name of the, whose duties are largely ceremonial. The national executive power is centered in the Council of Ministers, headed by the Prime Minister of India. Each state has its own elected government, where the head of stats is referred to as the Chief

Minister. India also has a system of local governments, the panchayat raj. Modern Indian government has decentralized several administrative functions to the local level, which in some cases has implications for responsibility and accountability in regards to community based health interventions.

The health system in India

The infrastructure of the Indian health system rests on the structure set by the Bhore committee report from 1946. The intention was to develop a well-integrated health system, where primary health care was available to all and with a strong referral system. The goals set by the report is still to be achieved and the capacity of the Indian health system is considered to be weak in several aspects such as lack of finances, poor management and lack of accountability [71].

The rapid economic growth has not generated an increase in government spending on health. India spends about 1% of GDP on health which is substantially less than many other countries. Much like Canada, India has a national health insurance program that is designed to provide baseline universal access to health care. However, this model poorly reflects the reality. A low level of government spending generates one of the highest out-of-pocket payments for health care in the world, which imposes a large financial burden on already poor households [72]. High levels of out-of-pocket payments has been argued to be one of the reasons for the inequity in health observed across the country [73]. A majority of the poorest households in India pay more than 40% of their capacity to pay for maternal health care services [74]. Potter and Brough conclude in their study of the Indian health and family welfare sector that 'In India, there is usually a lack of capacity in terms of structures and processes which allow health workers/managers and facilities to fulfill their potential' [75]. This is further supported by studies done on the reproductive health sector in India [76-79] .

According to the constitution of India, health care delivery is in large part the responsibility for each state. The role of the central government is to develop national policies, provide medical education and to some extent provide financial resources [80]. The National Policy from 1983, influence by the Bhore Committee report and the Alma Ata Declaration, aimed at establishing a strong public health system with decentralized primary health care as the foundation. This goal is in many states still to be accomplished, and many states remain dependent on the central government for financing large parts of the health care provided, especially in terms of equipment and medicines [81]. The central government's influence over the states is further reinforced by the five-year planning processes, which sets the goals of and priorities in terms of health. (ibid). The public health system is organized into care being provided at three levels: primary health care, secondary heath care, and tertiary health care. Primary health care should be provided at sub-centers and at primary health care centers (PHC), where each PHC is to supervise 6 sub-centers. Care at the sub-centers is to be provided by an auxiliary nurse and multipurpose health worker and serve a population of 5000 in plain areas and 3000 in remote rural areas, care at PHCs should be provided by a medical officer and other paramedical staff and be available for a population of 30000 in the plains and 20,000 in remote rural areas. Secondary health care, to which patients normally are referred to from primary health care, is provided at district hospitals and

community health care centers (CHC). The highest level of care is provided at the tertiary level, including medical colleges and advanced research institutions where specialized and high-tech care can be provided.

MATERNAL HEALTH IN INDIA

During the 1990s a series of large surveys disclosed poor maternal health indicators in India. The first and second National Family Health Survey and estimates from the Register General from India disclosed low utilization of care during pregnancy and delivery [82-84] . The dissemination of the findings from these surveys underlined maternal health as a major public health problem in India and facilitated the upswing of maternal health on the political agenda [85]. It was recognized that profound changes needed to be done in terms of how the health system was providing care to women during pregnancy, delivery and postnatal period. Hence, in 2000 the Government of India launched the National Population Policy, setting the ambitious goal of reducing the MMR to 100 per 100 000 live births. The main strategy to succeed in the reduction of MMR was to achieve 80% institutional deliveries and that 100% of deliveries being assisted by a medical professional by 2010 [86]. The same goals were later transferred into the National Health Policy adopted in 2002 [87]. Presently, many of the incentives introduced to improve maternal health falls under the National Rural Health Mission, a large-scale program introduced in 2005 to improve access to health care among India's large rural population.

The progress of improved maternal health in India is characterized by the wide spread of success stories as well as failures. It is estimated that 65% of the worlds total maternal mortality occur in India [3] and approximately 68 000 women die each year in pregnancy complications [2]. The nation wide MMR dropped substantially from 570 to 230 per 100 000 live births between 1990 and 2008. However, the overall average rate of MMR decline indicates that India will not achieve the Millennium Development Goal (MDG) of 108 [88], estimates predicts the MMR to be around 135 by 2015 [3]. Achievements and progress made in terms of reduced MMR and improved access to and use of maternal health care services in India is uneven and inequitable. In many ways India is a country of contrasts, and this is true also for maternal health. There are large differences in MMR and wide disparities in access to maternal health care services between different regions within India and between women that belong to different wealth quintile and to different caste group. The MMR ranges from 95 in Kerala to 480 in Assam [89]. The likelihood of receiving any type of ANC is lowest among women belonging to scheduled castes (SC) or to scheduled tribes (ST). Only 18% of the births among these women are conducted at a health facility, compared to 51% among women who do not belong to SC, ST, or any other backward casts (OBC) [90]. Indian society is largely stratified by gender and patrilineal descent and women's autonomy in terms of decision-making, mobility and access to and control over resources is constrained [91]. Gender equity, including female literacy, education and decision power, is closely linked to reproductive health [92].

The economic progress achieved in India during the past decades is remarkable. However, a growing economy have not been followed by increased spending on health and health indicators for some parts of the population does not correspond to the

economic progress. The progress to increase access to and use of maternal health care services is slow among women belonging to economically disadvantaged households [93]. Between 1992 and 2006 the use of antenatal care services in the whole of India increased with 12% but when divided between different wealth quintiles the increase among the poorest were only 0.1% [94]. The same trend is found when looking at skilled attendance at birth, where the total increase between 1992-2006 was 13%, while the increase among the lowest quintile was 2% [94]. Inequity due to economic status influences access to and use of maternal health care services in both urban and rural areas. India has a large urban population, with many poor living in urban slums. It has been shown that there are wide differences between poor women and non-poor women living in urban areas in terms of access to and use of maternal health care services [95,96]. In rural areas only 29% of the deliveries are conducted at a health facility [90]. Findings from a study based on data from NFHS 1 and 2 on factor influencing health-seeking behavior indicate that household wealth is a stronger factor than geographical access [97].

Gender discrimination is widely spread in the Indian society, preventing girls and women to access care during pregnancy and delivery. In 2010, India was ranked as number 112 of 134 countries on the global gender gap index [98]. Again, however, within India there are wide variations in how gender norms are defined and how these intermediate in society. The rights of women are protected in a wide range of laws and amendments; however, the implementation of such acts is weak. One such example is the common practice of child marriage. Despite the legal age for marriage being 18, data from 2006 show that in the age group of women between 20-24 years 18% of the women were married before the age of 15 and 47% were married before the age of 18 (NFHS 3). In the lowest wealth quintile as many as seventy-eight percent of all women in this age group were married before the age of eighteen. Child marriage in the context of India has been shown be associated with low use of antenatal care and low use of skilled birth attendants [99-102] . Married adolescent women have also been shown to have a unmet demand for contraceptives [103], are more likely to experience unwanted pregnancies [104,105] and more likely to experience complications during pregnancy and delivery [106-108] than non-adolescent married women. They often lack the autonomy to make decisions on maternal and reproductive health-seeking behavior [109-111] . The position of women in the household has also been shown to influence access to and use of maternal health care services [111,112]. Studies have shown that living together with in-laws in joint households negatively influences access to health care during pregnancy and delivery compared to women living in nuclear households together with husband and children [113,114]. Further, women often lack the right to their body and to their sexuality.

THE USE OF ANTIBIOTICS DURING DELIVERY IN THE INDIAN CONTEXT

The availability of antibiotics to treat infections during delivery and postpartum period is crucial to reduce maternal mortality. Each year some estimated 350 000 maternal deaths occur worldwide and one of the top leading causes of maternal mortality is infection [2,3]. Infection is estimated by the WHO to be the direct cause of 15% of the global maternal mortality [115], other studies has estimated infection to be the cause of death in as many as 30% of the global maternal mortality [116]. Preventing maternal

deaths caused by infections calls for increased access to health care interventions, including access to antibiotics.

However, the emerging challenge of antibiotic resistance also calls for precaution on how antibiotics are prescribed. The use of antibiotics to treat an infection by eliminating bacteria is an effective way of preventing death and ill-health. However, some bacteria survive treatment with antibiotics and respond by becoming resistant. This has been known since the discovery of penicillin [117]. Bacteria's ability to survive and adopt by becoming resistance was ignored by the academic community for many decades, allowing antibiotic resistance to grow into one of our times most pressing and acute global public health challenge [118,119]. The link between the extent to which antibiotics are prescribed and resistance have been documented at both an ecological level [120] and at an individual level [121]. In India, antibiotics are one of the most frequently prescribed drug groups [122-127] and antibiotic resistance is growing rapidly [128].
There is a wide spread misuse of antibiotics due to both antibiotics being highly available without a prescription and high prescription rates among health practitioners [129]. Studies conducted at primary and secondary health facilities in India have shown high prescription rates of antibiotics [130-132] .

Data on prescription rates of antibiotics during delivery is not well known in the context of India but it is likely to be cases of both over- and underutilization. There is no national policy on how antibiotics should be prescribed during vaginal or obstetric labor and many health facilities lack local guidelines. Further, policy on infections control, such as preventative measure including hygiene practices, are not available at national level and local guidelines are often absent. In its effort to reduce maternal mortality the Indian authorities are advocating and facilitating for pregnant women to deliver at health facilities. Access to skilled birth attendant and EmOC is identified as important factors in ensuring adequate care for women and child during delivery and the postpartum period. The increasing number of institutional delivers, however, poses new demands on the health system. One such demand is the development of policy on infection control during deliveries conducted at a health facility. This includes policy on prescribing antibiotics during vaginal delivery and obstetric labor , but also policy on preventative measures such as hand washing and other hygienic measures.

PRESENTATION OF STUDIES

STUDY 1: IMPLEMENTATION OF MATERNAL HEALTH POLICY

Studies on implementation of policy on maternal and/or reproductive health are often focused on showing if an intervention has been effective or not in terms of achieving a goal. The goal is sometimes measured in terms of utilization and sometimes in access. For example, during the past decade much effort has been put into increasing the number of institutional deliveries in India. One such effort has been to implement interventions offering financial incentives for women to have an institutional delivery. Studies looking at these interventions are often focused on providing data on if the implementation is successful in achieving the goal or not, which in this case is measured in increased institutional deliveries [133-135] . To study the outcome of an implementation of an intervention is indisputably important and essential in planning for adjustments and/or scaling-up. However, insights as to why a strategy has been success or not is equally important in making adjustments and moving forward. Few studies aim at providing findings beyond the scope of a single intervention, hence, the understanding of an intervention placed in a context of a system is rather limited.

The first study presented in this thesis is focused on the capacity of the health system in the state of Gujarat to implement the policies developed to improve maternal health and to reduce mortality due to pregnancy and delivery. The capacity of the health system in Gujarat is considered to be weak in several aspects [136-138] and the focus of the first study was to explore the overarching structure in implementation of maternal health policies rather than on single interventions.

The setting

The setting for this study is the state of Gujarat, located in the west of India. Gujarat has a population of just above 60 billion and is a highly urbanized state with 42% of the population living in urban areas [139]. Approximately 1.3 million annual births take place in Gujarat and the estimated MMR of Gujarat is 160 per 100,000 live births (SRS, 2009). According to the latest District Level Household and Facility Survey (DLHS 3) conducted in Gujarat during 2007-2008, 56.4% of the women had institutional deliveries and 71.5% received at least one antenatal check-up (NFHS 3). However, the coverage of maternal health care services is unevenly distributed between regions and sub-populations. In Gujarat, the health system challenges to improved maternal healthcare (e.g. lack of health professionals, weak referral systems, lack of facilities and supplies) are well known and interventions have been developed to meet these challenges. Training of doctors in gynecology and anesthesia and training of midwifes are ongoing, the infrastructure is being improved to ensure functioning referral systems, and facilities are being upgraded to so called First Referral Units where basic and comprehensive emergency obstetric care should be available, are all examples of activities ongoing to strengthen the capacity of the health system to provide maternal healthcare [140-142] . Despite comprehensive measures to improve the situation, challenges to implementation remain [143-145] and maternal mortality and morbidity persists.

Objective

The objective of the study presented in this paper was to explore the process of implementing policies aiming at improving maternal health in the state of Gujarat.

Conceptual framework

The definition and perceptions of policy implementation as a phenomenon is in this study based on assumptions of the policy cycle presented in the background (Carney 2012). The *policy triangle framework,* developed by Walt and Gilson, is used to provide a framework for how to approach the policy process. The framework stresses the importance of going beyond the content of a policy when studying the policy process and emphasizes the influence of actors, the processes and the context. The policy triangle considers how these aspects of policy interact and shape the policy process.

Data collection

Altogether, 12 high-level stakeholders with extensive experience from working with maternal health in Gujarat were interviewed. The stakeholders can, roughly, be divided into three groups: those that work with or close to politics that influence maternal health policy, those that work with designing the interventions, and those that work with the management of implementing the interventions into the heath system. Obviously, these three areas of responsibility overlap. Each key stakeholder was interviewed individually. The interviews lasted about 90 minutes and each interview took place at a location chosen by the interviewee. The interviews where conducted in English, tape recorded and transcribed verbatim. They were carried out in the fall of 2009 and the spring 2010. The conceptual framework was also used when designing the interview guide. Following the model of the policy triangle, open-ended questions and probing questions was asked in relation to the *content* of the interventions, the *context* in which they are being implemented, the *actors* involved in the process and on the structures of the *process*. The interview guide was not designed to directly ask about these aspects of implementation in separate questions. The ambition was rather to let the respondents speak freely on matters relevant for the objective of this study and for the interviewer to probe on these aspects of the policy process.

Data analysis

To analyze the transcribed interviews qualitative content analysis was used as defined by Hsieh and Shannon: “a research method for the subjective interpretation of the content of text data trough the systematic classification process of coding and identifying themes or patterns” [146]. *Conventional content analysis* was used to approach the data, which means that the use of preconceived categories was avoided and that the codes and categories are derived directly from the text rather than being based in a specific theory [146]. The conceptual framework was used in designing the study, however, the conceptual framework was not used as a model to organize or analyze the data. The analysis involved a constant moving between the entire data set, individual interviews and coded extracts from the data. The steps taken in the analysis was: 1) reading the entire data set repeatedly to obtain a sense of the depth of the data, 2) coding each transcript individually, 3) developing themes based on codes, 4) reviewing the themes by going back to the text and extracting codes, and 5) defining and naming the themes. The development of themes was conducted by looking at the

relationship between the codes and through interpretation of patterns found throughout the data set.

STUDY 2: ANTIBIOTIC PRESCRIBING DURING DELIVERY

Much attention in policy on reduced maternal mortality in India has during the past decade been dedicated towards increased institutional deliveries. An increase of the number of women delivering their babies at an institution puts new demands on the health system. Some of these demands are more obvious, such as ensuring access to adequately trained health professionals and the availability of supplies and equipment. Other demands are not as obviously related to maternal health, such as the need of policy on how to prescribe antibiotics during inter- and postpartum care. Presently, there is no such policy available, leaving health professionals without guidelines on how to prescribe antibiotics during delivery. The high level of prescribing rates of antibiotics in studies conducted in institutional settings in the context of India indicates that an increase in institutional deliveries will lead to an increase in use of antibiotics. Access to antibiotics is essential in saving lives of women suffering from an inter- and/or postpartum infection. However, misuse of antibiotics will add to the already alarming high levels of antibiotic resistance. Further, since most health care during delivery is paid out-of-pocket unnecessary prescribing of antibiotics will lead to additional burden of expenses on poor families.

The setting

Madhya Pradesh is one of the larger states of India, both in terms of square feet and in terms of the size of the population. Madhya Pradesh has a large population living in poverty. Based on national cut-off points used to measure household wealth, 29% of the households in Madhya Pradesh belong to the poorest quintiles and in rural areas as many as 68% of the households are in the lowest or second lowest quintile [144]. Maternal health indictors for Madhya Pradesh are among the poorest in India. Data from the District level household and family survey conducted in 2007-2008 show that 47% of deliveries take place at a health facility, ranging from 13% in Dindori to 79% in Indore [144]. Sixty-six percent of the women had experienced at least one complication during delivery, and 41% had had post-delivery complications including high fever and abdominal pain.

Objective

The aim of this study was to present the prevalence, types and duration of antibiotic prescribed during and after vaginal delivery or caesarean section in a tertiary care hospital in the city of Ujjain located in the state of Madhya Pradesh, India.

Data collection

This study used a prospective cross-sectional design and data was collected from April 2008 to December 2010 at the VD Gardi Charitable Trust Hospital. The data used for this study was drawn from a large data set, set up by the research group, on the prescribing of antibiotics at this hospital. The hospital is non-teaching hospital with 350 beds, located in the city of Ujjain and run by the Ujjain Charitable Trust Hospital and Research Centre, a non-profit organization. Fees are charged for consultation and treatment in the hospital. Data on the prescribing of antibiotics were collected daily by

the nursing staff who used a specific form attached to all patient files for recording the data. The data collection process has been described earlier in-depth in Sharma et al [147].

Data management and analysis

In total, 1077 women admitted to the VD Gardi Charitable Trust Hospital, who had delivered in the hospital; either as vaginal delivery or cesarean section; were included in the study. Of these 566 (53%) had a vaginal delivery and 511 (47%) had a cesarean section. The main variable, *prescribing of antibiotics*, was analyzed separately for the group of women who had had a vaginal delivery and for the group of women that had had a cesarean section. Descriptive statistics was performed to calculate the total prescribed antibiotics in hospital and at discharge, the mean number of days for which antibiotics were prescribed and prescribing by age group, place of residence and days of stay in the hospital.

The Anatomical Therapeutic Chemical (ATC) classification system and defined daily dose (DDD) was used to classify the prescribed antibiotic [148]. The ATC system divides the active substances into groups and subgroups and the DDD is the assumed average maintenance dose per day for a drug when used for its main indication in adults. The DDD provides a fixed unit of measurement, independent from e.g. strength and price, which enables research on patterns in the prescribing of drugs. For this study, the total DDD and DDD/100 bed days was used to present the prescribing of antibiotics.

A bivariate and multivariable logistic regression was conducted for the vaginal deliveries to study the association between the binary outcome antibiotic prescriptions (yes, no) and the following variables: age (18-20, 21-30, >=31), place of residence (Ujjain city, Nearby city, Villages of Ujjain district, Other districts, Cities of the nearby district, Other district villages) and days of stay in the hospital (1-2, 3-5, >5). Data was entered using Epi info (version 3.1) and Excel, and the analyses were conducted using SPSS (version 21.0) and Stata (version 12.1), Texas, USA.

MAIN FINDINGS

STUDY I: LIMITATIONS IN HEALTH SYSTEM CAPACITY

The findings in paper I, indicate that limitations in the health system have implications for the capacity to implement maternal health interventions in Gujarat. Three such challenges were identifies in the analysis of the interviews: lack of continuity, the complexity of coordination, and lack of confidence in and underutilization of the monitoring system.

Lack of continuity

Findings from the interviews show that the work on maternal healthcare at the state level in Gujarat is more dependent on individual stakeholders than on sustainable structures and processes. The dependency of individuals rather than on structures and processes are perceived by the respondents to have an impact on long-term objectives and long-term planning. With weak structures and poorly established processes the long-term memory and lessons learnt are lost when there is a shift in heads. Findings from the interviews show that the respondents perceive lack of evaluation and follow-up as a barrier to implementation. Yet, variation as to how extensive this problem is in the setting of Gujarat varies between the respondents.

The complexity of coordination

The results from the interviews show that coordination of maternal health interventions is acknowledged as an important aspect of improving the health system to provide comprehensive maternal healthcare. Coordination between actors at different levels of the health system within specific interventions was brought up during the interview, however coordination between interventions and at system level was the focus of most interviews. In Gujarat, there are several examples of efforts to link interventions on maternal healthcare to each in a way that they support and develop the comprehensive network of interventions needed to provide maternal healthcare. The interventions on health system improvements are also linked to interventions aimed at changing the behavior of the public, such as improving eating habits to reduce anemia among pregnant women and information campaigns on the importance of skilled birth attendance. Yet, there are also examples of how coordination remains an important challenge to implementation of interventions of maternal healthcare. To implement strategies that are dependent on several interventions and therefore requires comprehensive coordination between different institutions at different levels of the health system are difficult and is perceived as remaining challenge among the respondents.

The role of follow-up

Systems to monitor the healthcare provided during pregnancy, delivery and postnatal period, and the number of maternal deaths, is by all respondents of the interviews emphasized as important for the implementation process. Data on figures from the field is stressed as crucial to assess the needs in specific areas of the state and also to continuously follow-up the progress being achieved. Monitoring systems are also seen as key in making evaluations needed to make necessary adjustments. The importance of

monitoring as a way of ensuring accountability is also brought up. The confidence in quality of the data collected and the ways it is being used to conduct evaluations and follow-up differs between the respondents but most agree on that there are important biases in the data due to several difficulties in how data is collected and analyzed. One such example that is said to effect the quality of data is that in Gujarat, there are several records where maternal mortality is being registered. This is brought up by the respondents as something that is likely to affect the accuracy of the data.

STUDY II: ANTIBIOTICS PRESCRIBED DURING AND AFTER DELIVERY

In total, 1077 women admitted to the VD Gardi Charitable Trust Hospital, who had delivered in the hospital; either as vaginal delivery or cesarean section, were included in the study. Of these 566 (53%) had a vaginal delivery and 511 (47%) had a cesarean section. In the group of women who had a vaginal delivery 491 women (87%) were prescribed antibiotics and in the group of women who had a cesarean section 503 (98%) were prescribed antibiotics in the hospital. The mean numbers of days on antibiotics in hospital for women with a vaginal delivery were 3.1 (±1.7) and for women with cesarean section it was 6.0 (±2.5) (Table 1).

The most commonly prescribed antibiotic groups during the hospital stay among the women who had a vaginal delivery were third generation cephalosporins (J01DD), which were prescribed in 35% of the cases. This was followed by a combinations of antibacterials (J01RA) prescribed in 20% of the cases and penicillins with extended spectrum (J01CA) prescribed in 15% of the cases. Among the women who had a cesarean section, the most commonly prescribed antibiotic during the stay in hospital was third-generation cephalosporins (J01DD) prescribed in 31% of the cases, followed by the fixed dose combinations of antibacterials (J01RA) prescribed in 30% of the cases and fluoroquinolones (J01MA) prescribed in 13% of the cases. The total DDD/100 bed days during hospital stay for the group of women that had a vaginal delivery was 101 and 127 for women having had a cesarean section (Table 2).

Twenty-eight percent of the women with both vaginal deliveries and with cesarean sections were prescribed antibiotics at discharge. The most commonly prescribed group of antibiotic at discharge for women that had a vaginal delivery was fluoroquinolones (J01MA) prescribed in 42% of the cases, followed by second-generation cephalosporins (J01DC) prescribed in 16% of the cases and penicillins with extended spectrum (J01CA) prescribed in 14% of the cases. Among the women that had a cesarean section the most commonly prescribed antibiotics at discharge was fluoroquinolones (J01MA) prescribed in 59% of the cases, followed by third-generation cephalosporins (J01DC) prescribed in 11% of the cases and second-generation cephalosporins (J01DC) and combinations of penicillins, incl beta-lactamase inhibitors (J01CR) prescribed in 9% of the cases each.
(Table 2).

Table 1. Overview of antibiotic prescribing among patients with vaginal delivery and cesarean section (N=1077)

Characteristics		Diagnosis Vaginal Delivery 566(%)	Cesarean Section 511(%)
Total antibiotic prescriptions[*a]		491 (87)	503 (98)
Prescribed antibiotics after discharge [b]		160 (28)	141 (28)
Age [b]			
	18-20	99 (17)	66 (13)
	21-30	429 (76)	401 (78)
	>=31	38 (7)	44 (9)
Place of Residence [b]			
	Ujjain city	269 (48)	270 (53)
	Nearby city	90 (16)	67 (13)
	Villages of Ujjain district	81 (14)	60 (12)
	Other districts	50 (9)	53 (10)
	Cities of the nearby district	32 (6)	25 (5)
	Villages of other districts	44 (8)	36 (7)
Days of hospital stay [+a]			
	1-2	323 (57)	29 (6)
	3-5	192 (34)	175 (34)
	>5	51 (9)	307 (60)
Days on antibiotics[** a]		3.1±1.74	6.0±2.52

[*] number and percentages; Chi-Square test. [**]mean and standard deviations; Kruskal-Wallis equality-of-populations rank test. [a]P-value<0.05. [b]P-value>0.05.[+]Fisher's exact test.

Table 2. Description of antibiotics prescribed during hospital stay and at discharge (N=4721)

		Vaginal Delivery			Cesarean Section		
		N (%)	Total DDD	DDD/100 bed days	N (%)	Total DDD	DDD/100 bed days
During hospital stay							
ATC	Name						
Total		1496 (100)	1510	101	3225 (100)	4109	127
J01CA	Penicillins with extended spectrum	226 (1)	140	62	46 (1)	35	77
J01CR	Combinations of penicillins, incl beta-lactamase inhibitors	109 (7)	144	132	272 (8)	440	162
J01DB	1st generation cephalosporins	35 (2)	14	41	44 (1)	23	51
J01DC	2nd generation cephalosporins	82 (5)	91	111	116 (4)	135	116
J01DD	3rd generation cephalosporins	525 (35)	628	120	988 (31)	1460	148
J01DH	Carbapenems	4 (0.27)	2	50	3 (0.09)	3	100
J01EE	Combinations of sulfonamides and trimethoprim, incl derivatives	1 (0.07)	0	0	4 (0.12)	0.5	13
J01FA	Macrolides	8 (0.53)	15	188	10 (0.31)	33	333
J01GB	Other aminoglycosides	31 (2.)	18	59	233 (7)	199	86
J01MA	Fluoroquinolones	173 (12)	214	124	430 (13)	709	165
J01RA	Combinations of antibacterials	297 (20)	240	81	983 (30)	1013	103
J01XD	Imidazole derivatives	5 (0.33)	3	60	96 (3)	58	60
At discharge							
ATC	Name						
Total		425 (100)	151		952 (100)	153	
J01CA	Penicillins with extended spectrum	61 (14)	16				
J01CR	Combinations of penicillins, incl beta-lactamase inhibitors	18 (4)	4		82(9)	14	
J01DB	1st generation cephalosporins	25 (6)	3		35(4)	2	
J01DC	2nd generation cephalosporins	66 (16)	32		82(9)	12	
J01DD	3rd generation cephalosporins	42 (10)	16		104(11)	26	
J01EE	Combinations of sulfonamides and trimethoprim, incl derivatives	2 (0.47)	0.1		46(5)	0.5	
J01FA	Macrolides	5 (1)	2				
J01MA	Fluoroquinolones	177 (42)	75		561(59)	96	
J01RA	Combinations of antibacterials	29 (7)	3.2		42(4)	2	

DISCUSSION

In this thesis, two perspectives on health system strengthening are presented. In paper I the focus is on the structures of the health system, where the findings indicates that limitations in coordination, continuity and monitoring influences the capacity of the health system in Gujarat to implement maternal health interventions. In paper II the focus is on the need for policy in terms of how antibiotics should be prescribed during and after delivery conducted at health facilities. The findings from each study will be discussed below.

HEALTH SYSTEM CAPACITY AND MATERNAL HEALTH

The findings from paper I, indicates that there are limitations in how the health system is organized and that this has implications for the system's capacity to implement. Three such components, continuity, coordination and monitoring, were identified as being important aspects in understanding the lack of capacity.

The findings show that decisions being made and the course of action being advocated for are perceived as being more dependent on individual actors than on sustainable structures. This is likely to have an impact on long terms memory but potentially also on the motivation of working with a strategy knowing that it might not be carried out before abandoned. The influence of actors and structures for continuity has been shown to be important in other settings. A study from Pakistan studying health system reform shows that when there is a change in heads in the government this is likely to trigger a shift in focus [149]. The authors of this paper argues that this causes a loss in momentum. In South Africa a review of lack of implementation of the AIDS policy , Wouters et al points to the challenge in terms of the focus and efforts being made seems to be attached to individuals rather than to structures less dependent on actors [150].

The responsibility and accountability of maternal healthcare in Gujarat is divided between several departments and divisions within the Government of Gujarat. Over the last decade, the power over health related issues has also been decentralized to local governmental bodies called Panchayats. Additionally, the involvement of private providers and NGOs in providing maternal healthcare services is widespread throughout the state. This creates a comprehensive and complex network of institutions and stakeholders that are involved in developing, implementing and administrating maternal healthcare programs and interventions. Coordination has previously been pointed out as a weakness of the Indian health system [151,152]. The findings from the study presented here seconds that conclusion, where coordination between actors at different levels of the health system within and between interventions is described as weak and this weakness is perceived as being likely to influence the capacity to implement maternal health policies. Similar results can be found in a comparative study of policy processes in maternal health in India, Vietnam and China, where coordination is found to be an important factor when implementing policy on health issues that span across several sector of an health system, such as policy on maternal health [153]. The findings presented in paper I indicates that the social and political context in Gujarat influences the capacity of the health system to implement policy on maternal health.

ANTIBIOTIC PRESCRIBING PRACTICES – THE NEED OF A POLICY

Emerging antibiotic resistance is a major global public health challenge. At the same time, untreated infections are one of the main causes of maternal mortality in low and middle-income countries [154]. The topic of antibiotic use is complex in the context of India. It is likely that there is a widespread overuse of antibiotics but also a challenge of antibiotics being unavailable when needed. Preventing maternal deaths caused by infections calls for increased access to health care interventions, including access to antibiotics. However, the emerging challenge of antibiotic resistance also calls for precaution on how and when antibiotics are prescribed. Studies from India have shown high rates of prescribing of antibiotics among health practitioners (deCosta et al 2008, Potharajua 2011, Kumar et al 2008). Presently, 47% of the deliveries in India are conducted at a health facility. One of the main strategies advocated by the Government of India to reduce maternal mortality and morbidity is universal access to institutional delivery. Few studies have looked at antibiotic prescribing during delivery in health facilities but findings from previous studies and from the study presented in this thesis the likelihood of antibiotics being prescribed during delivery can be assumed to be high. Hence, increased number of deliveries being conducted at a health facility is likely to increase antibiotic prescribing.

Resistance typically develops when antibiotics are prescribed in inadequate amounts and for conditions that does not require treatment with antibiotics. Antibiotics save lives of women suffering from or at risk of developing and infection during or after delivery and access to antibiotics needs to be considered as an essential factor in improving maternal health outcomes. Yet, antibiotics resistance is a challenge that needs to be addressed. A policy on prescribing antibiotics during and after childbirth needs therefore to both emphasize the importance of ensuring access and availability of antibiotics and to provide guidelines on how antibiotics should be prescribed to reduce the risk of misuse of antibiotics that add to the development of resistance. The results from paper II show that the type, dose and duration of prescribed antibiotics both for vaginal deliveries and cesarean sections differs from internationally acknowledged recommendations. Factors influencing chices in regards to prescribing antibiotics during childbirth is not well studied or understood in the setting of Madhya Pradesh.. Studies from other settings have suggested the heavy workload, lack of information and feeling of pressure to prescribe have been suggested to influence the prescribing of antibiotics [155]. The factor influencing the choice of type, dose and duration of antibiotics during vaginal delivery and during cesarean sections in the setting of India needs to be further studied and incorporated into the development of a policy.

THE IMPORTANCE OF CONTEXT – INEQUITY AND MATERNAL HEALTH

The emphasis on reproductive health as a social phenomenon as much as a medical event is again being advocated for in regards to the Millennium Development Goals. It is now evident that the targets of the MDGs in general and MDG 5 in particular will not be achieved by 2015 as intended. The failure of reaching the targets of MDG 5 is increasingly being analyzed and discussed in terms of equity [156-158] . Structures in society cause inequitable access to maternal and reproductive health care. Poverty and gender bias are examples of such structures causing inequity. To

reach the groups most vulnerable to mortality and morbidity during pregnancy, delivery and postnatal period, policies and programs need to address inequities. It also requires increased focus on equitable health system [159].

Poverty and ill-health are intertwined. Low and middle income countries tend to have worse health outcomes than high income countries, and within countries the poor tend to have worse health outcomes than the non-poor. This association runs in both directions: the poor are more vulnerable and exposed to ill-health and ill-health retain the poor in poverty [160-162] . Poor women are in many settings less likely to receive adequate care during pregnancy and delivery than non-poor women [163-168] . To meet the challenge of increasing access to care during pregnancy, delivery and postpartum period policies on incentives to change health seeking behavior have been introduced. Perhaps the most common incentive is voucher schemes, where women are ensured free-care and provided with financial compensations to reduce indirect costs paid out-of-pocket [169,170]. Voucher schemes to increase access to care among poor women have been introduced in Pakistan, Bangladesh and India [171]. The association between poverty and maternal health is, however, complex and demands community based interventions in addition to financial incentives and health system strengthening. Examples of focus of additional policies are female literacy and education and improving the nutritional status of women during pregnancy to prevent anemia.

Gender inequality and inequity are among the fundamental structures of social hierarchy that shape how people are born, grow, live, work, age, and die [172]. However, while economic status is increasingly recognized as a key factor in improving maternal and reproductive health, the widespread and profound implications for gender-based inequities remain often unaddressed [173]. For example, women's autonomy has been shown to be influential in health seeking behavior during pregnancy, delivery and postnatal period [174-179] . A woman's autonomy is often defined as the ability to make and to execute decisions about her own body, to have access to information, to have control over material resources, and not being exposed to domestic violence [180,181]. However, women's right to make decisions in regards to their sexual and reproductive health is a controversial and sensitive topic. Women's sexual and reproductive health is in many societies closely interlinked with moral and norms, and often comprises the foundation of gender roles of women in a given society. The sensitive nature of this topic has implications for how women's autonomy is addressed, or not addressed, in policies and programs on maternal and reproductive health. Women's position in the household and in the community is often neglected in the discussion on how to improve maternal and reproductive health, leaving out one of the key factors influencing maternal and reproductive health seeking behavior. Gender inequality increasingly needs to be considered and dealt with when developing and implementing maternal health care policies and interventions [182].

In India, social determinants such as poverty and gender influences maternal health considerably. To better understand how inequity influences maternal and reproductive health in the context of India areview on the topic as conducted as a part of the work presented in this thesis. The full review is presented in a published article (appendix 1) [183]. In the last few decades, India has experienced rapid economic growth. However, large proportions of the population have not benefited from this progress. Insufficient allocations of public spending on health between urban and

rural areas and between preventative and curative services; access to quality care among the poor; and high out-of-pocket expenditures act as key barriers to inequitable access to health care in India [184]. The findings from the review show that disadvantage groups within the population in India are systematically and consistently being disadvantaged in terms of access to and use of maternal and reproductive health care. India has made significant progress in terms of improved maternal health over the past two decades, however, progress among the poorest has been shown to be insignificant [93,94]. Further, patriarchic structures has been shown to act as barriers to improved maternal health by influencing women's autonomy [111-114] and by supporting practices such as child marriage [99,100,104,105,185]. The findings from the review show strong support for equity being a highly important aspect to consider when developing and implementing policy. India has an integrated policy framework for human development and public policy as well as a great variety of social protection schemes, which can be seen as a reflection of the intention of improved health among the disadvantaged segments of the population [186]. However, policy processes needs to a larger extent take into account that pregnancy and delivery occur in a context that to a high degree defines how to relate to the medical aspect of these events. Policy makers and others involved in defining and implementing a policy on maternal and/or reproductive health needs to take into account aspects of equity.

CONCLUSIONS AND POLICY RECOMMENDATIONS

The capacity of the health system in Gujarat needs to be strengthened, both in terms human resources, finance, technology, organizational structures, service infrastructure and information systems, and in terms of focusing on the influence of ideas and interests, relationships and power, and values and norms. The findings from this study suggest that in the context of Gujarat the capacity of the health system to implement maternal health policy could be strengthened by:

- strengthening coordination between actors at different level of the system and between interventions dependent on each other for its functioning,
- by ensuring continuity in the policy process, and
- by establishing functional monitoring system that can provide high quality data on maternal health indicators that can be used when planning for development and adjustments of policy on maternal health.

In the setting of India, there is likely to be cases of both over- and under use of antibiotics during delivers conducted at health facilities. The findings from study II presented in this thesis show high rates of prescribing of antibiotics to women having both vaginal deliveries and cesarean section, and a deviation from WHO guidelines on type and duration of antibiotics recommended to be prescribed. Presently, India does have a policy guiding the prescribing of antibiotics. To meet the challenge of a growing antibiotic resistant and to ensure evidence based, high quality care in terms of antibiotic prescribing during delivery at health facilities, a policy is needed. The findings presented in this thesis suggest that such policy needs to include:

- strategy on making antibiotics available in health facilities to ensure the availability of treatment of infections occurring due to complications during or after delivery,
- recommendations on antibiotics use during obstetric labor, including type, timing of injection and duration of treatment,
- recommendations of prophylactic use during and after a vaginal delivery, including recommendations for assisted vaginal delivery,
- recommendations for infectious control beyond the use of antibiotics, such a hygiene practices.

Policy processes needs to a larger extent take into account that pregnancy and delivery occur in a context that to a high degree defines how to relate to the medical aspect of these events. Policy makers and others involved in defining and implementing a policy on maternal and/or reproductive health needs to take into account aspects of equity. Structural determinants, such as poverty and gender, needs to be addressed in both development and implementation of policy on maternal health. Poverty and gender act as intermediary determinants depending on a specific context, making it difficult to recommend generalizable solutions to how focus on equity should be incorporated into policy on maternal health.

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