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Inclusive Agricultural Growth in Pakistan—Understanding Some Basic Constraints

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Inclusive agricultural growth is important for overall economic growth and particularly critical for rural socio-economic stability and poverty reduction in Pakistan. The majority of Pakistan's population and 44 percent of the overall labour force are dependent upon agriculture which only accounts for a little over 20 percent of national GDP. The paper highlights some basic constraints that have not been explicitly addressed in the policy research and implementation and have impeded inclusive agriculture growth. A descriptive analysis based on data from the Agriculture Census of Pakistan and the Pakistan Household Income and Economic Survey—both of which were conducted in 2010-11—is used to show how high levels of poverty and its disparity across regions, combined with the declining size of operated holdings and associated fragmentation especially in the smallest size categories which now form over 60 percent of the agricultural holdings in Pakistan, are fundamental constraints. Poverty is both the result as well as the consequence of fragmented markets, weak institutions including governance; and, inadequate policy research and implementation. A better research based policy understanding of some basic constraints, and the variations across regions in such factors such as the declining size and fragmentation of operated farms, rural poverty; and, the levels of market development and institutions is essential along with effective implementation. One size fits all policies have not and will not work.

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1. INTRODUCTION

Pakistan is primarily an agricultural economy despite the structural transformation of the economy which has reduced the share of agriculture in GDP to around 20 percent. Over 44 percent of the labour force is still directly dependent upon agriculture as is the bulk of the country's manufacturing and trade [Pakistan (2014)]. It is widely believed that the dismal performance of the economy and particularly that of the agriculture sector in recent times has been accompanied by increasing poverty. Poverty in Pakistan is high and increasing and rural poverty is higher than urban poverty and increasing [Malik, *et al*. (2014)]. The large proportion of the labour force that is dependent upon the shrinking share of agricultural GDP could be one of the reasons for this.

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Why has agriculture growth failed in Pakistan? Is inclusive agriculture growth[1] possible? What are the most fundamental constraints not explicitly addressed in Pakistan's policy and implementation.

The obvious challenges to agriculture growth in Pakistan have been known for decades. The flat (low) yields despite the large yield gaps relative to demonstrated potential [see Annex Figure 1]; the lack of diversification away from the four major crops wheat , cotton, sugarcane and rice [see Annex Figure 2];[2] the low productivity of water and non-reliability of water services; the under-performance of rural factor and input markets; the rapidly declining investment—especially public investment, including the serious under-investment in research and technology development; and the inadequate dissemination of this technology and decayed extension services are all well documented. These results are shown in documents such as the Report of the National Commission on Agriculture (NCA) 1988, the National Agricultural Policy 1991, the Agricultural Perspective and Policy 2004 and the Draft National Food Security and Agriculture Policy 2013.

Some of the underlying factors that have impeded the surmounting of these challenges to Pakistan's agricultural growth and hence employment generation and rural poverty reduction have also been discussed in the available literature. These include unequal land distribution and the resultant skewed distribution of power and policy biases; the inefficient allocation and use of irrigation water; government intervention in markets that creates distortions and rent seeking opportunities for a few; the neglect of agriculture in the policy decision making hierarchy and in resource allocation decisions except decisions that lead to elite capture; the serious disconnects between the center and the provinces in decision making and implementation and above all a tendency to enforce one size fits all policies in a regulatory environment that discourages investment and reduces market efficiency.

What has not been explicit in the debate in Pakistan to date, however, is a clearer understanding of the source structure of Pakistan's agricultural incomes from which this inclusive poverty reducing growth is supposed to emanate and the constraints that are inherent in it. There has been a huge change in the size structure of farms in Pakistan, mostly at the lower end of the distribution, with associated implications for the poverty status of the farming population and hence the ability to invest for growth. The number of under 5 acre operators has more than tripled between 1960 and 2010, from 19 percent of all farms to over 64 percent of all farms [Pakistan (1960 and 2010)]. Moreover there is a huge disparity in the source structure of rural incomes not only by farm size but also by regional location. These regional disparities result in part from the diversity of natural resource endowments but also in large part from the vast disparity in the development of infrastructure (both hard and soft) and markets; and, availability of public and private resources across regions. One size fits all policies cannot be expected to work in this scenario. This paper therefore, aims to present a descriptive analysis based on two large nationally representative data sets from 2010 to clarify the fundamental underlying

[1]We define inclusive growth as one which provides a level playing field and possibility of participation for all. For an interesting discussion on the definition of inclusive growth please see Lipton M. and van der Gaag Jacques (1993).

[2]Maize is a recent exception.

problem. The analysis here is backed by a review of the existing international literature to enable a contextualisation of implications of these constraints and assist further policy research and implementation to ensure that agriculture can play its role of providing inclusive growth and poverty reduction in Pakistan.

Following this introduction the literature review is presented in Section 2. The data sets are described briefly in Section 3. The analysis is presented in the subsequent sections and is followed by policy implications and recommendations in the last section.

2. LITERATURE REVIEW

A growing body of international evidence confirms that when agriculture grows, overall economic growth reduces both rural and urban poverty faster. Increasing agricultural productivity can benefit millions through higher incomes and poverty reduction, surplus and cheaper food, and by generating new development opportunities that are employment-intensive. Numerous international studies highlight that when agriculture grows rapidly, poverty declines rapidly as well.[3] However, when agriculture is stagnant even as other sectors grow, poverty declines relatively little. According to a DFID policy paper, "no country has ever successfully reduced poverty through agriculture alone, but almost none have achieved it without first increasing agricultural productivity."[4] The essential element of poverty reduction in this reasoning is rapid growth in agricultural production.

Mellor and Dorosh (2010) conclude that a high rate of agricultural growth has far reaching positive implications for economic development in terms of accelerating employment and accelerating poverty reduction.[5] In most low income countries, rapid agricultural growth provides a large share of GDP growth as well. However, agriculture's dominance in employment growth continues even into middle income status as its share of GDP growth declines. Additionally, agricultural growth fosters a "diffused spatial pattern" of non-agricultural growth through its multiplier effects to the rural non-farm sector. This is because as incomes in the farm sector grow, expenditure on rural and non-farm goods and services produced in these same small towns grow as well.

A dramatic acceleration of both agricultural and rural growth immediately followed the Green Revolution of the 1960s although the gains have slowed significantly especially in the case of Pakistan. Over time, the revolution has drawn a host of supporters as well as critics who have questioned its impact on reducing poverty and inequality. Numerous critics have blamed the Green Revolution for income inequalities, maldistribution of assets and the worsening of absolute poverty. Niazi (2004) for example, argues that the Green Revolution contributed to the process of rural impoverishment and inequality in Pakistan by consolidating pre-existing socio-economic differences, caused by uneven access to productive resources such as land which favoured the rich. According to Cleaver (1972), these inequalities were exacerbated by

[3]Timmer, C. P. (1997) "How Well do the Poor Connect to the Growth Process?" *CAER Discussion Paper No. 178*, Harvard Institute for International Development, Cambridge.

[4]DFID (2005) 'Growth and Poverty Reduction: The role of Agriculture", *DFID Policy Paper,* December 2005, pp. 1.

[5]Mellor, J. W. and Dorosh, P. (2010) "Agriculture and the Economic Transformation of Ethiopia", International Food Policy and Research Institute, Working Paper 010, April 2010, pp. 5.

what he described as the "innate bias of the Green Revolution towards the rich in rural Pakistan, a situation that favoured commercial farmers, better-off peasants and large landholders over poor peasants, simple commodity producers, subsistence smallholders and landless tenants".[6] As such, Niazi and Cleaver both echo the arguments made by early critics of the Green Revolution, who pointed out that it would merely worsen the incidence of rural poverty, and contribute to an uneven distribution of rural resources, assets and income.[7]

Junankar (1975) points to a similar story in India, arguing that the Green Revolution increased inequality in rural India.[8] He highlights that the high-yielding varieties introduced during this period required regular supply of irrigation and fairly large amounts of fertiliser, which favoured the rich, large farms over small farms. Although Junankar argues that large farms began to substitute capital (e.g. tractors) for labour, he does not specifically investigate the impact of the Green Revolution on employment and wages. According to an IFPRI publication in 2002, *Green Revolution: Curse or Blessing*, a major shortcoming of the Green Revolution was that it spread only in irrigated and high-potential rain-fed areas. As such, many villages or regions without sufficient access to water were left to benefit only indirectly through increased employment, migration opportunities and cheaper food. In India for example, incomes in many low-potential rainfall areas have improved little while poverty in irrigated and high-potential rain-fed areas has reduced since the revolution.[9]

By contrast, supporters of the Green Revolution often speak of its impact on agricultural growth, which has been linked to new income and employment-generating opportunities, including in the local, non-farm economy. Indeed, the Green Revolution had a substantial impact on agricultural and food production. The adoption of high yielding varieties resulted in both yields and production of rice and wheat virtually doubling. In Asia, as more area was planted to high yielding varieties, cereal production doubled between 1970 and 1995. Instead of widespread famine, cereal and calorie availability per person increased by nearly 30 percent, while prices of wheat and rice fell.[10] Earlier, Mellor (1966) had argued that the rural population in third world countries would obtain significant benefits from agricultural growth, as income-generating opportunities arose in the local, non-farm sector.[11] He maintained that agricultural development focused on small and medium sized farms would generate rapid, equitable and geographically dispersed growth owing to agriculture's substantial labour-intensive linkages with the rural, non-farm economy.

Hazell, *et al*. (2007) present a particularly compelling case for channelling development efforts to support small farms. The argument is based on two principal

[6]Cleaver, Harry (1972) 'The Contradictions of the Green Revolution', *Monthly Review*, Vol.24, No.2.

[7]Niazi, T. (2004) "Rural Poverty and the Green Revolution: The Lessons from Pakistan", *The Journal of Peasant Studies*, 31:2, 242–260.

[8]Junankar, P. N. (1975) "Green Revolution and Inequality", *Economic and Political Weekly*, Vol. 10, No. 13 (Mar. 29, 1975), pp. 1.

[9]In addition to Niazi, Cleaver and Junankar, other trenchant critics of the Green Revolution include Gadgil and Guha (1995), Griffin (1972, 1974, 1989), Glaeser (1987) and Pearse (1980).

[10]International Food Policy and Research Institute. 2002. *Green Revolution: Curse or Blessing?*, IFPRI, pp. 2.

[11]Mellor, John W. 1966. *The Economics of Agricultural Development*, Ithaca, NY: Cornell University Press.

considerations: (1) the efficiency of small-scale agriculture in the developing world; and (2) the equity and poverty-reduction nature of smallholder agricultural development. The efficiency argument for supporting small farms is based on extensive research that has explored the inverse relationship between farm size and production per unit of land. The data highlights that larger farms have lower gross and net yields per hectare of land per year, relative to smaller farms. Although the results can vary based on definitions of farm size and measures of productivity, the evidence for this inverse relationship is strongest in Asia, where land is relatively scarce as compared to labour.

The standard explanations for this inverse relationship highlight the small farms' more intensive use of labour and the lower costs associated with supervising family labour on small farms relative to hired labour on larger farms. Economies of scale in agriculture may apply as farms grow in size in input supply, processing and transport of cash crops, but generally, economies of scale are weak. In fact, there may be some diseconomies of scale once production exceeds the scope and capacity of the large farm.[12] Nevertheless, the scale of farming comes with different sets of transactions costs for different types of operations. When labour costs constitute a large proportion of agricultural costs, as in most developing economies, small farms may have significant advantages over larger units. This is because unit transaction costs associated with labour search, supervision and screening decrease as farm size falls—given that household members are a large part of the workforce in small farms and the farm operator has a smaller area over which to supervise.[13] In contrast, when economies develop, wages rise and agriculture becomes more capital intensive, large farms have the advantage because they choose low labour/capital ratios (as in developed countries where labour is more costly relative to capital) in an effort to cut unit transaction costs associated with capital. Therefore, in developing countries where land is scarce relative to labour, small farms have the competitive edge for less technologically advanced agriculture because they cut transaction costs associated with labour [Hazell, *et al.* (2007)].

It is worth recognising that the evidence for the inverse relationship is not undisputed. Arguing against an exclusive focus on smallholders, Collier and Dercon (2014) summarise a number of theoretical arguments. For example, they point out that the smallest farms may be less efficient if collateral requirements impact their ability to raise working capital. As such, economies of scale need to be outweighed by plausible market imperfections for the inverse productivity relationship to hold. They also argue that most investigations of the inverse relationship rely predominantly on yield data from small farms less than 5 hectares, telling us little about the yields of larger farms. Therefore, the inverse productivity relationship may be a product of the efficiency of small farms among smallholder farms rather than a reflection of the inefficiency of large farms.

Indeed, Collier and Dercon (2014) are sceptical of the evidence base arguing for an efficiency based argument favouring smallholder agriculture. Nevertheless, they clarify that while the current model and inverse relationship may be flawed, this "does not mean smallholders are *not* reasonably efficient in what they do, given the market failures and other constraints they face". They do, however, conclude that a narrow focus on smallholder agriculture is not a guaranteed recipe for growth, and that a greater role

[12]Hazell, *et al*. (2007) 'The Future of Small Farms'. pp. 10.
[13]Lipton M. (2006) "Can Small Farmers Survive", pp. 78.

for larger farms in experimenting and pushing the technological frontier should be emphasised. Similarly, with potential economies of scale higher up the value chain in logistics, finance and marketing, they argue in favour of larger farms and larger scale commercial investment in agriculture.

Hazell, *et al*. (2007) makes a strong case for preferring small-scale farms to large farms in terms of equity and poverty reduction. One particularly compelling finding is that small-farm households tend to have more favourable expenditure patterns for promoting growth of the local nonfarm economy. They spend higher shares of incremental income on local non-tradeables, thereby stimulating demand for many labour-intensive goods and services in the rural non-farm economy. Through strong links across the economy, small farms are able to create new income and employment opportunities and ultimately, contribute to growth and poverty-reduction. In order to achieve this rapid agricultural growth with positive economy-wide linkages, Mellor and Dorosh (2010) argue that it is necessary to engage "middle-farmers"[14]. These are described as farmers who are large enough to adopt new technologies and produce market surpluses, yet small and numerous enough to have expenditure patterns that drive a vibrant, rural non-farm sector.

Recognising that smallholders are a diverse set of households and individuals with varying constraints on their ability to undertake potentially profitable activities in the agricultural sector, Fan, *et al*. (2013) distinguish between three types of smallholder farmers: subsistence farmers without profit potential, subsistence farmers with profit potential and commercialised smallholder farmers. These farmers are distinguished based on the type of constraints they face. Subsistence farmers without profit potential face both "soft" and "hard" constraints to land size and agricultural production. Soft constraints include limited access to markets and information, limited financial capital and limited access to quality infrastructure, while hard constraints include marginal lands that are far from markets and limited in size, low rainfall, and poor soil quality. Unlike pure subsistence farmers with limited profit potential, smallholder farmers that have the potential to turn productions systems into profitable enterprises face primarily soft constraints. With a little help, these farmers could successfully be linked to value chains and generate high growth in agricultural production. The constraints they face can be addressed through various policy and programmatic channels, which will be discussed later in this section. Finally, commercial smallholders are those already involved in profitable agricultural activities but are held back from scaling up these commercial activities due to factors such as limited access to capital, insurance and other risk-reducing tools.

Hazell (2013) also outlines similar differences within the motives and contributions of small farms. Commercially viable small farms for example, are market driven and generate significant market surpluses, particularly in Asia and Africa. They are powerful engines of rural economic growth, creating new income and employment opportunities in both the farm and rural nonfarm economy. Investing in them can therefore go a long way in spurring rapid growth in agricultural production and lifting the poor out of poverty, similar to what happened during Asia's Green Revolution. On the other hand, there are subsistence-oriented poor farmers who are invariably net buyers of food with minimal market-orientation. Investing in them is more of a safety net approach to poverty reduction rather than a growth strategy.

[14]Mellor, J. W. and Dorosh, P. (2010) "Agriculture and the Economic Transformation of Ethiopia", International Food Policy and Research Institute, Working Paper 010, April 2010, pp. 5.

Based on the above distinctions, it appears that while some smallholders have the potential to shift from subsistence farming to commercial oriented and profitable farming systems, others may need to be supported in exiting agriculture and seeking non-farm employment opportunities [Fan, *et al*. (2013)]. Hazell (2013) argues that a large number of small farms are not going to make it as commercial businesses, especially asset-poor farmers in remote regions.[15] Nevertheless, an often exclusive focus on direct poverty alleviation has taken attention away from those smallholders that do have significant agricultural potential and can contribute to growth and poverty reduction. However, these smallholders continue to face a number of challenges that limit their ability to undertake more productive and innovative activities.

Mellor and Malik (2015), in a recent paper on the dominant role of the small commercial farmer in growth and poverty reduction in Pakistan, define the rural classes relevant to growth, employment and poverty reduction to demonstrate how those definitions can be translated into area defined categories; and, to modelling the impact of each class on growth and employment. They also analyse the effect of varying the proportions of each class on growth and employment.

This study adds to the literature by highlighting the poverty trap that chokes the agriculture sector of Pakistan and the urgent need for specific attention to the predominant smallholder sector and to regional disparities.

3. DATA

We use data from the Pakistan Bureau of Statistics, Household Income and Economic Survey (HIES) 2010-11 for the estimation of the income by sources and data from the Agriculture Census of Pakistan 2010 for the distribution of farm households. We estimate the headcount of poverty by size of farm and by region using the HIES 2010-11 data.

A comparison of the data sets in Table 1 below indicates that the raised data from the HIES covers about 55.5 percent of all rural households in the Agriculture Census.

Table 1

A Comparison of the Data

Size of Farm (Acres)	Number of Households (HIES 2010-11)	Percentage of Households (HIES 2010-11)	Number of Households (Ag Census 2010)	Percentage of Households (Ag. Census 2010)	HIES Hholds as % of Ag Census Hholds
No Land	8,718,243	65.0	15,743,523	66.0	55.4
upto 5 acres	2,664,507	20.0	5,350,940	22.0	49.8
5 to under 12.5	1,447,051	11.0	2,048,984	9.0	70.6
12.5 to under 25	349,781	3.0	560,743	2.0	62.4
25 to under 50	85,183	1.0	210,910	1.0	40.4
50 to under 75	33,902	0.3	52,700	0.2	64.3
75 and above	19,447	0.1	40,210	0.2	48.4
Total	13,318,113	100	24,008,011	100	55.5

Source: Reports of HIES 2010-11.
http://www.pbs.gov.pk/sites/default/files/pslm/publications/hies10_11/complete_report.pdf page 21
Report of Agriculture Census 2010. http://www.pbs.gov.pk/sites/default/files/aco/publications/agricultural_census2010/WRITE-UP%20AGRI.%20CENSUS%202010.pdf

[15]Hazell, P. (2013) "Is Small Farm Led Development Still a Relevant Strategy for Africa and Asia?" pp. 11.

While the percentage of households in each size category differs marginally, in broad aggregate the proportions are similar. The limitations of HIES 2010 are discussed in detail in Malik, *et al.* (2014). Here we take refuge in large numbers to assume that the results are broadly indicative.

4. RESULTS

Size and Tenure

Data from the Agriculture Census of 2010 helps to provide a detailed profile of the size and tenancy structure of farms in Pakistan. Nearly 65 percent of all farms in Pakistan are less than 5 acres in size whereas 25 percent are between 5 and 12.5 acres. This can be seen in Table 2. This implies that nearly 90 percent of all farms in Pakistan are currently less than 12.5 acres which was traditionally designated as the minimum subsistence level of holding. Any large surpluses for overall inclusive growth and poverty reduction have to come from the remaining 10 percent of farms. But these remaining farms are also diverse across regions in quality and development and are fragmented.

Table 2

Tenancy Status and Fragmentation by Farm Size in Pakistan

Size of Farm (acres)	Owners %	OCT %	Tenant %	Total %	No. of House-holds	% of Total Households	ONO %	SC %	Farm Size (acre)	Frag Size (acres)
more than zero but less than 5 acres	86	6	7	100	5,350,941	64.7	5	10	2	1
5 and but less than 12.5	77	14	9	100	2,048,984	24.8	3	17	7	2
12.5 and but less than 25	72	20	8	100	560,743	6.8	3	19	17	5
25 and above	74	20	6	100	303,819	3.7	8	19	60	15
Total	84	9	7	100	8,264,488	100	4	13	6	4

Source: Computed from Government of Pakistan, Census 2010.

Note: OCT denotes Owner cum tenant, ONO denotes Owner Non Operator, SC denotes Share-cropper, Frag denotes Fragment.

The situation is further compounded by tenancy arrangements that require that a part of the produce be paid in rent or in kind share. Nearly 13 percent of all under 5 acres farms are either owner cum tenant or tenant holdings and share cropping continues to be the predominant form of tenancy arrangement according to this data. Nearly 10 percent of the smallest size category of farms is sharecropping.

As already stated the small sized farm is further composed of smaller fragments. While the overall average farm size is about 6 acres the average size in the smallest less than 5 acres category is only about 2 acres. Land fragmentation exacerbates the situation. The average size of a fragment is nearly 4 acres overall and only 1 acre in the smallest less than 5 acres category. These small fragments compound the crop husbandry and management problems.

Size Structure and Regional Disparity of Rural Incomes

The low levels of yields and inadequate access to credit, inputs and technology can be put in the context of the vicious low level trap that is strangling Pakistan's agriculture potential.

How can the country increase productivity and promote agricultural growth, when more than 68 percent of the total crop income and nearly 68 percent of the total livestock income of Pakistan comes from operational holdings of the traditionally defined less than 12.5 acre subsistence level. This was a level of operational holding deemed just sufficient to meet the subsistence needs of the farm family. This definition from the 1950s does not take into account the enormous additional population pressure which Pakistan's population explosion has generated over the last sixty years. In this context the smaller categories of farm size are forced to diversify to other sources of income to subsist such as wages, salaries, business income, rentals, pensions and other transfers. With inadequate development of domestic commerce this is a very difficult situation. The data in Table 3 highlights this situation.

Table 3

Percentage share of Each Source of Income by Farm Size in Pakistan

Size of Farm (Acres)	Crop Income	Livestock Income	Wages and Salaries	Business Income	Rental and Pension Income	Other Transfer Income	Remittances	Total Income
No Land	0	16	82	75	73	70	71	49
more than zero but less than 5 acres	27	40	12	17	17	17	20	21
5 and but less than 12.5	41	28	4	6	7	10	7	18
12.5 and but less than 25	18	10	1	1	2	3	1	7
25 and above	14	6	1	1	2	0.4	1	5
Total	100	100	100	100	100	100	100	100

Source: Computed from Government of Pakistan (2010-11) www.pbs.gov.pk/content/household-integrated-economic-survey-hies-2010-11.

There are large regional variations also that stem from the diversity of agro-climatic and socio-economic conditions and the size of the regions. Within the crop and livestock income nearly 19 percent of crop income and 30 percent of livestock income comes from one zone only i.e. the Rice/Wheat zone of Punjab (Table 4).

As already stated for the smallest under 5 acre category (or put another way for 65 percent of the farm households of Pakistan) Crop and livestock income together account for only 58 percent of all income. They have to rely on other sources of income to subsist (Table 5).

Table 4

Percentage share of Each Source of Income in Total Income by Agro-Climatic Zones

Zones	Crop Income	Livestock Income	Wages and Salaries	Business Income	Rental and Pension Income	Other Transfer Income	Remittances	Total Income
Rice/Wheat Punjab	19	30	17	20	22	15	27	21
Mixed Punjab	16	18	14	16	20	9	11	16
Cotton/Wheat Punjab	23	18	16	14	10	14	13	20
Low Intensity Punjab	10	8	8	12	5	18	6	9
Barani Punjab	1	5	8	6	24	1	12	4
Cotton/Wheat Sindh	11	5	5	1	1	2	0.2	7
Rice/Other Sindh	11	5	8	2	2	12	0.2	8
KPK	6	11	20	28	16	23	30	11
Balochistan	4	0.3	3	1	0	5	0.5	3
Total	100	100	100	100	100	100	100	100

Source: Computed from Government of Pakistan (2010-11) www.pbs.gov.pk/content/household-integrated-economic-survey-hies-2010-11

Table 5

Percentage Share of Source of Income in Each Farm Size in Pakistan

Pakistan-Size of Farm (acres)	Crop Income	Livestock Income	Wages and Salaries	Business Income	Rental and Pension Income	Other Transfer Income	Remittances	Total Income
No Land	0	3	56	19	4	2	15	100
more than zero but less than 5 acres	37	21	19	10	2	1	10	100
5 and but less than 12.5	65	17	8	4	1	1	4	100
12.5 and but less than 25	73	16	5	2	1	1	2	100
25 and Above	78	12	4	3	1	0.1	2	100
Total	28	11	34	13	3	2	10	100

Source: Computed from Government of Pakistan (2010-11) www.pbs.gov.pk/content/household-integrated-economic-survey-hies-2010-11

Crop and livestock income are most important in cotton/wheat Sindh where these together account for nearly 90 percent of all income, and least important in Barani Punjab where it accounts for 37 percent and KPK where it accounts for 44 percent (Table 6).

Table 6

Percentage Share of Each Source of Income in Total Income by Agro-climatic Zones

Zones	Crop Income	Livestock Income	Wages and Salaries	Business Income	Rental and Pension Income	Other Transfer Income	Remittances	Total Income
Rice/Wheat Punjab	51	25	10	6	1	1	7	100
Mixed Punjab	56	21	10	6	2	0	4	100
Cotton/Wheat Punjab	65	16	10	4	1	1	4	100
Low Intensity Punjab	59	16	10	8	1	2	4	100
Barani Punjab	13	24	25	10	9	0.3	18	100
Cotton/Wheat Sindh	79	11	9	1	0.2	0.3	0.2	100
Rice/Other Sindh	74	12	12	1	0.3	1	0.2	100
KPK	27	17	21	15	2	2	16	100
Balochistan	80	2	14	1	0.0	2	1	100
Total	56	18	12	6	1	1	6	100

Source: Computed from Government of Pakistan (2010-11) www.pbs.gov.pk/content/household-integrated-economic-survey-hies-2010-11

The Poverty Trap

This size of farm and sources of income structure translates into high levels of poverty. The estimates of the incidence of poverty based on the total expenditures necessary to provide the minimum calorie requirement of 2350 calories per adult equivalent, which translates into poverty line expenditure of Rupees 2413 per adult equivalent per month, are presented in Table 7 by farm size and Table 8 by agro climatic zone.

Table 7

Incidence of Poverty by Farm Size in Pakistan

Size of Farm (acres)	Percentage of Poor Households in Category	Percentage of all Poor Households
No Land	49	72
more than zero but less than 5 acres	40	20
5 and but less than 12.5	34	7
12.5 and but less than 25	23	1
25 and Above	10	0.3
Total	45	100

Source: Government of Pakistan, Census 2010 and Government of Pakistan (2010-11) www.pbs.gov.pk/content/household-integrated-economic-survey-hies-2010-11

Table 8

Incidence of Poverty by Agro-climatic Zones (Excluding Non-farm Households)

Zones	Percentage of Poverty	Percentage of Poor Households
Rice/Wheat Punjab	24	9
Mixed Punjab	22	8
Cotton/Wheat Punjab	36	16
Low Intensity Punjab	54	21
Barani Punjab	29	6
Cotton/Wheat Sindh	43	11
Rice/Other Sindh	47	6
KPK	44	23
Balochistan	33	4
Total	36	100

Source: Government of Pakistan, Census (2010) and Government of Pakistan, HIES (2010-11).
Note: Using Poverty Line Rs. 2413 per AE per month.

Nearly 45 percent of all rural households are estimated to be below the poverty line in 2010. The incidence of poverty is highest in the non-farm sector and in the smallest size of farm categories. And poverty varies by agro-climatic zones. This means that the smaller size categories are much more disadvantaged in the poorer zones and regions.

In-optimal input use, limited ability to take risks or diversify cropping patterns, and the continuing low labour productivity responsible for the low inclusive growth of Pakistan's Agriculture is in large measure due to the high levels of poverty of the farm sector and consequently its poverty reducing potential.

5. SOME POLICY RECOMMENDATIONS

If the current situation continues the poverty trap will worsen and agriculture productivity and growth will decline even further. Declining farm size and fragmentation will make it impossible to support an already unsustainable crop sector.

In addition to the size of farm, type of tenure, structure of incomes and its regional disparity, and the poverty trap it perpetuates that were discussed above, Pakistan's agriculture sector also faces a series of traditional challenges even if it gets beyond the huge constraints described above.

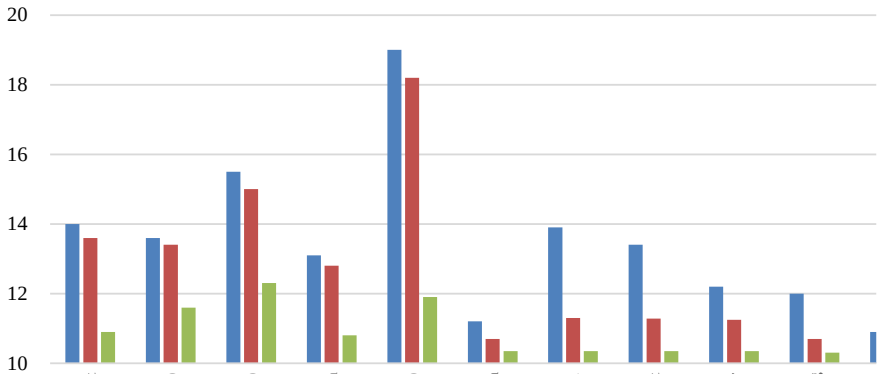
Foremost in terms of the challenges, following Fan, *et al*. (2013) categorisation of soft constraints, are insufficient access to markets, quality infrastructure and technology, the high marketing and transportation costs and higher transaction costs and lower profit margins.

The national research system does not prioritise smallholder-friendly technologies. The extension system is all but non-existent. The public system like in many developing countries has been scaled back under the assumption that the market will take care of these needs. However, the private sector tends to serve larger farms and those favourably located near roads and markets so as to ensure lower transaction costs.

Pakistan has an inadequate system of land titling and a fragmented and weak rural credit market that makes it difficult to undertake the necessary investments to scale up agricultural operation. Land grabbing has taken away some of the most productive land and the development of housing colonies has displaced many smallholders from land as well as markets. The lack of access to education and the skills necessary to manage production systems and adopt innovative and high-return technologies add an additional burden.

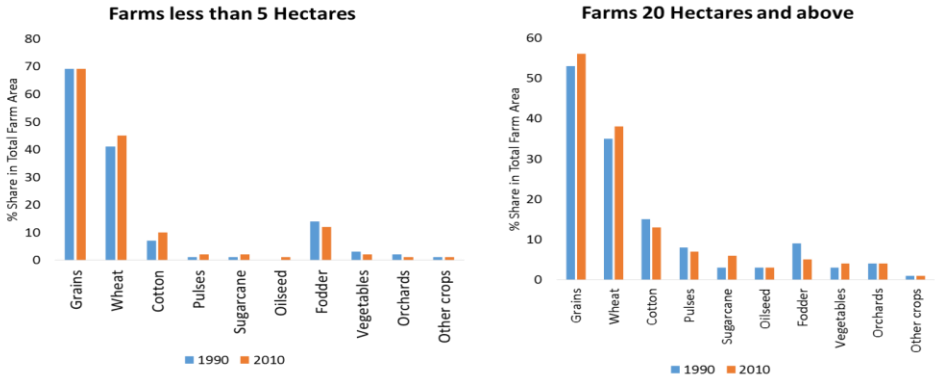
The way forward is to move towards a science based and context-specific set of farm policies. The elements of the resilience approach can be built upon to improve risk-mitigation and adaptation strategies for the small holder agriculture of Pakistan. It involves putting the small farmer in the centre of all policy making and support, to learn and build on indigenous knowledge and promote value chains that favour the small farmer. Policy needs to focus on encouraging smallholder-friendly financing and investment. Most importantly the system needs to recognise the importance of agricultural research and policy support.

Annex Fig. 1. Pakistan's Agriculture Yield Potential



Source: PARC (2011).
Note: Yields for cows are measured as liters/day.

Annex Fig. 2. Limited Diversification of Pakistan's Crop Agriculture



Source: Agriculture Census (1990 and 2010).

Annex Table 1

Classification of Districts into Agro-climatic (Crop) Zones

Zone	Districts
Barani Punjab	Attock, Rawalpindi, Islamabad, Jhelum, Chakwal
Mixed Punjab	Sargodha, Khushab, Faisalabad, Toba Tek Singh, Jhang, Okara
Low Intensity Punjab	Mianwali, Bhakkar, M. Garh, Layyah, D.G. Khan, Rajanpur
Cotton/Wheat Punjab	Sahiwal, Pakpattan, Multan, Lodhran, Khanewal, Vehari, Bahawalpur, Rahimyar, Khan, Bahawalnagar
Rice/Wheat Punjab	Gujrat, M.B. Din, Sialkot, Narowal, Gujranwala, Hafizabad, Sheikhupura, NanKana Sahib, Lahore, Kasur
Cotton/Wheat Sindh	Khairpur, Ghotki, Sukkur, N. Feroze, Nawabshah, Sanghar, Thar parkar, Mirpur khas, Umarkot
Rice/Other Sindh	Jacobabad, Kashmore, Shikarpur, Larkana, K.S.Kot, Dadu, Jamshoro, Hyderabad, Matiari, Tando Allahyar, T.M.Khan, Badin, Thatta, Karachi
KPK	All Districts
Balochistan	All districts

Source: Authors, adapted from Pinckney (1989).

REFERENCES

Cleaver, H. (1972) The Contradictions of the Green Revolution. *American Economic Review* 62:2, 177–186.

Collier, P., and S. Dercon (2014) African Agriculture in 50Years: Smallholders in a Rapidly Changing World? *World Development* 63, 92–101.

DFID (Department for International Development) (2005) Growth and Poverty Reduction: The Role of Agriculture. (Policy Paper). pp. 1.

Fan, S., B. Joanna, K. Michiel, and H. Alex (2013) *From Subsistence to Profit: Transforming Smallholder Farms*. Washington, D.C.: International Food Policy Research Institute (IFPRI). (Food Policy Report).

Gadgil, M. and R. Guha (1995) *Ecology and Equity: The Use and Abuse of Nature in Contemporary India*. London: New York: Routledge.

Glaeser, B. (1987) Agriculture between the Green Revolution and Eco-development: Which Way to Go. In *The Green Revolution Revisited: Critique and Alternatives*, 1-7. London: New York: Routledge.

Griffin, K. (1972) *The Green Revolution: An Economic Analysis*. United Nations Research Institute for Social Development, 72.6.

Griffin, K. (1974) *The Political Economy of Agrarian Change: An Essay on the Green Revolution*. Cambridge: Harvard University Press.

Griffin, K. (1989) *Alternative Strategies for Economic Development*. Palgrave Macmillan Press.

Hazell, P. (2013) *Is Small Farm Led Development Still a Relevant Strategy for Africa and Asia*?. pp. 11.

Hazell, P., C. Poulton, S. Wiggins, and A. Dorward (2007) The Future of Small Farms for Poverty Reduction and Growth. Washington, DC: International Food Policy Research Institute. (IFPRI 2020 Discussion Paper 42).

IFPRI (International Food Policy and Research Institute) (2002) *Green Revolution: Curse or Blessing?* IFPRI, pp. 4.

Junankar, P. N. (1975) Green Revolution and Inequality. *Economic and Political Weekly* 10:13, A15–A18.

Lipton, M. (2006) Can Small Farmers Survive, Prosper, or be the Key Channel to Cut Mass Poverty. *Electronic Journal of Agricultural and Development Economics* 3:1, 58–85.

Lipton, M. and J. van der Gaag (1993) *Including the Poor*. Washington, DC: World Bank.

Malik, S. J., *et al*. (2014) The Official Estimates of Poverty in Pakistan—What is Wrong and Why?—Illustrations using the Government of Pakistan's Household Integrated Economic Survey 2010-11. Pakistan Strategy Support Program of International Food Policy Research Institute: Islamabad. (PSSP Working Paper).

Mellor, J. W. (1966) *The Economics of Agricultural Development*. Ithaca, NY: Cornell University Press.

Mellor, J. W. and P. Dorosh (2010) Agriculture and the Economic Transformation of Ethiopia. Washington, DC: International Food Policy Research Institute. (IFPRI Discussion Paper 10).

Niazi, T. (2004) Rural Poverty and the Green Revolution: The Lessons from Pakistan. *The Journal of Peasant Studies* 31:2, 242–260.

Pakistan, Government of (1960) *Agricultural Census*. Islamabad: Agricultural Census Wing, Pakistan Bureau of Statistics.

Pakistan, Government of (2010) *Agricultural Census*. Islamabad: Agricultural Census Wing.

Pakistan, Government of (2010) *Household Integrated Economic Survey (HIES)*. Islamabad: Pakistan Bureau of Statistics.

Pakistan, Government of (2014) *Economic Survey 2013-14*. Islamabad: Ministry of Finance.

Pearse, A. (1980) Seeds of Plenty, Seeds of Want: Social and Economic Implications of the Green Revolution. *Revisiting Sustainable Development*, 139.

Pinckney, T. (1989) The Demand for Public Storage of Wheat in Pakistan. Washington, DC: International Food Policy Research Institute. (IFPRI Research Report 85).

Timmer, C. P. (1997) How Well do the Poor Connect to the Growth Process? Harvard Institute for International Development, Cambridge. (CAER Discussion Paper 178).