

Baseline Survey of
National Program for Food
Security and Productivity
Enhancement

PAKISTAN



Data Collected
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and Productivity Enhancement

Ministry of Food and Agriculture (MINFA)



United Nations World Food Programme (WFP)



Ministry of Food and Agriculture (MINFA)

PARC Pakistan Agricultural Research Council

API Agriculture Policy Institute

Pakistan: “Baseline Survey of National Program for Food Security and Agricultural Productivity Enhancement in Pakistan” (Crop Maximization Project – Phase II)

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List of Acronyms

AJK	Azad Jammu and Kashmir
API	Agriculture Policy Institute
CB&FSA	Crop Bench and Food Security Assessment
CMP	Crop Maximisation Project
CMPII	Crop Maximisation Project phase II
CWIQ	Core Welfare Indicator Questionnaire
DAP	Di-Ammonium Phosphate
DHS	Demographic and Health Surveys
FAO	Food and Agriculture Organisation
FATA	Federally Administered Tribal Areas
FANA	Federally Administered Northern Areas
FCS	Food Consumption Score
FCG	Food Consumption Group
GER	Gross Enrolment Rate
GoP	Government of Pakistan
GPI	Gender Parity Index
HIES	Household Income and Expenditure Surveys
HQ	Headquarters
Kcal	Kilocalorie
MINFAL	Ministry of Food, Agriculture and Livestock
MoU	Memorandum of Understanding
NGO	Non Governmental Organisation
NER	Net Enrolment Rate
NP	Nitrogenous Phosphate
NWFP	North Western Frontier Province
PARC	Pakistan Agricultural Research Council
PRHS	Pakistan Rural Household Survey
PSLM	Pakistan Social and Living Standards Measurement Survey
PCA	Principal Component Analysis
Rps.	Rupees
SPFS	Special Programme for Food Security (FAO)
VAM	Vulnerability, Analysis and Mapping
WFP	World Food Programme
WI	Wealth Index

Executive Summary

This study was carried out in 1,012 villages targeted for the first phase of the National Programme for Food Security and Productivity Enhancement, better known as Crop Maximisation Project phase II (CMPII), funded by the Government of Pakistan and implemented by the Ministry of Food, Agriculture and Livestock (MinFAL). The survey was designed and implemented by the World Food Programme (WFP) Pakistan Country Office under a Memorandum of Understanding with CMPII. Data collection was entrusted to five national NGOs and took place between February and May 2008. It was carried out by several teams each comprising three enumerators and one supervisor. Data entry was done at CMPII headquarters, while data analysis and report writing were carried out by the Vulnerability, Analysis and Mapping (VAM) Food Security Analysis unit in the Pakistan WFP Country Office with the support of an external consultant and the Food Analysis Unit at WFP Head Quarters.

The report has produced recommendations for interventions that aim to achieve higher productivity and incomes of small and medium farmers without increasing their vulnerability to external shocks. The survey was administered using a sample mostly composed of small and medium farmers, potential participants in a crop improvement programme residing in villages targeted for having better road access and more irrigated or potentially irrigable lands. The possibilities for extrapolating conclusions about the wider population are therefore limited.

Data analysis suggests that food insecurity does not appear to be an immediate concern for farmers in the survey area. Households that rely on unskilled agricultural wages to supplement agriculture production from small plots are most likely to have borderline food security status, and are therefore more at risk to face a food crisis. These households are vulnerable to various shocks, particularly those that may cause increases in food and non-food prices or drops in crop production.

Since less than one third of rural households own land and out of these, two thirds own less than 5 acres, survey data may reveal the tip of the iceberg. Moreover, the data shows that household food security status is determined more by its consumption of, and therefore access to, milk and milk products than by consumption of cereals. Off-farm income may therefore be crucial to allow investment in milk animals and/or purchase of milk in the market.

On the other hand the vulnerability of farming households, as indicated by their wealth status, appears to be an important determinant of whether these households would be willing to invest resources in order to increase crop productivity. The data indicates that households would rather diversify their sources of income than put their energies into the highly risky business of crop production in an environment in which water supply may be extremely unreliable, prices of inputs and outputs are highly volatile and risks are of a covariate nature. In fact, average household incomes are much higher for those households that have additional sources of income from permanent employment, commercial activities or remittances.

Besides production and income, access to health services, housing and sanitation affects household food security. Better health services, reasonably constructed houses and improved sanitation lead to a healthy and productive nation.

Finally, the data confirms that education is a major determining factor in reducing household vulnerability and improving food security. This is because educated members are more likely to have higher incomes, send their children to school and live in improved housing and sanitation conditions.

The analysis of the survey data outlined a number of constraints to crop, particularly wheat, production, in the study area:

- ☞ **Cost of agricultural inputs** (seeds, fertilizer, pesticides) represents a substantial proportion of total production costs and is not always justified by returns. As a result, more than half

the farmers do not use improved seeds. This is particularly relevant in AJK and in Punjab. They also apply fertilizer at much lower than recommended rates.

- ☞ **Land preparation is inadequate:** Less than 50 percent of farmers use a chisel plough to prepare their land despite the fact that, according to the survey data, this can significantly improve yields. Reasons in this case are both availability and affordability. A farmer not owning a tractor and/or a plough will have to rent it from outside. Not only is this expensive, but after deep ploughing, the farmer will need soil levelling and seed bed preparation, both of which imply additional costs.
- ☞ **Low returns to investment:** Production costs are very high and leave only approximately 4,000-5,000 Rs per acre to remunerate family labour. Despite government efforts to keep prices of inputs and grain at acceptable levels, farmers have been facing major increases in all other production costs.
- ☞ **Small farm sizes are not economical:** Inadequate revenues per acre coupled with small cultivated land areas limit the total income that can be derived from agriculture. Only farmers with off-farm sources of income can make ends meet.
- ☞ **Unreliability of water supply** for irrigation causes farmers, especially those at the tail end of canals, to reduce input use in order to minimise risks of production. The situation is likely to worsen this year as irrigation water competes with hydro-electric power needs.
- ☞ **Competition between crops:** high cropping intensity hides risk and farmers may not be able to clear their fields in time to sow the following crop. This is not infrequent when delays in harvesting of sugarcane, cotton or paddy reduce the time available to farmers to prepare the land for wheat or forces them to skip the wheat crop altogether. This year, the problem is compounded by frequent power cuts, dramatically reducing the processing capacity of cotton ginneries. Delays in cotton harvesting are likely to cause a decrease in the area planted with wheat this year.

As resource constrained farmers use fewer than recommended inputs and do not adequately prepare their land for lack of own farm implements, one may be tempted to advocate for improving their access to inputs and implements through credit. Indeed, data shows that, with the exception of Sindh, less than one third of households have had access to credit in the past two years. As argued above, however, investment in agriculture is relatively risky and increasing credit may put farmers, especially the poorest and more vulnerable, in a vicious cycle of indebtedness.

In general, interventions that reduce production risks, by for instance smoothening fluctuations of input and output prices, or insuring against these risks are more likely to lead to productivity increases.

An integrated farming support mechanism should be developed in order to provide inputs to the vulnerable through a single operating unit in these areas.

Adequate water availability for crop production needs special attention. Efforts should be made to minimize water losses and protect areas from water logging. Improvement in water courses and changing traditional water harvesting are important factors for productivity enhancement and increasing crop area. Improving water use efficiency should also increase reliability of water supply if farmers at the head of canals have less reason to take more than their share.

Improved seed is always a serious problem and is mostly not available during sowing season. This is because of the limited production of seed, particularly wheat, at research centres. There is a great need for seed multiplication and storage at district or even community level. Local NGOs can play a better role in meeting demand. The project should provide seed money to local NGOs to develop mechanisms for seed multiplication, storage and distribution. This could include the development of seed banks at district/tehsil/community level.

During the survey it was observed that a considerable amount of farm manure is converted into dung cake for fuel purposes, being a cheap source of energy for poor families. The project should introduce cheaper, more efficient sources of energy in the area in order to allow the maximum accumulation of farm manure for crops.

Actions should take into consideration differences between households in terms of size of farmland.

- ☞ **Small farmers** can not afford production risks and have little to invest in crop production. Farmers with small landholdings (below 5 acres) should be provided with a relief package in order to guarantee a minimum income to support families. These packages could be made conditional to participation in asset building initiatives. For instance, poor households may be offered free inputs on the condition that they send their children to school and/or vaccinate them and/or re-invest part of the resulting additional income in activities that further stimulate production and/or create local added value (e.g. improvements in irrigation infrastructure, village banks, small processing factories, storage structures, etc.). Examples could be taken from the FAO sponsored Special Programme for Food Security in Central America, particularly that implemented in Honduras.
- ☞ **Tenants** are always at high risk of losing their land and thus have less interest in future investment. Tenants are high in number and play a significant role in agriculture sector growth. Protection of tenants is important in terms of food security and sustainability of livelihoods. Subsidies should be provided to tenants rather than to owners and tenants should be given greater control over the sale of farm produce. To achieve this, it is extremely important that landless tenants are made part of formal farmer organisations supported by MinFAL.
- ☞ **Landless** people constitute a significant percentage of the population in the area and should not be excluded from benefiting from the project. Landless people support the agriculture sector, providing transport, skilled and unskilled labour, marketing, repair of equipment, and other services. The project should focus on small business development in the area and ensure a minimum income to those whose income is below the limit to meet essential food and non-food costs.

Finally, benchmark indicators were proposed to measure the effects of the CMPII on productivity and income and on wealth and food security of households. In addition, indicators that reflect the achievement of intermediary results related to household access and use of inputs and technology have also been proposed.

1 Introduction

1.1 Background of study

In 1998, a three year pilot project under the FAO funded Special Programme for Food Security (SPFS) was started by the Ministry of Food, Agriculture and Livestock (MinFAL) in 3 locations (i.e. villages) in Pakistan. The project, called “The Improved Irrigation Technologies, Farm Inputs and Extension Services”, aimed to increase and sustain agricultural productivity and income of small farmers and rural households. Encouraging results showed increases in production between 60% and 100% and near doubling of producer incomes in the 3 villages. As a result, the Government of Pakistan (GoP) funded, through MinFAL, an up-scaling of the project in 109 villages in 15 Districts. This “Crop Maximisation Project” (CMP) ran from 2003 to 2006, but was not as successful as the pilot, reportedly because a change from subsidised input distribution to bank administered loans caused a dramatic drop in farmer participation rates. The GoP later decided to revert to the original strategy and progressively extend the intervention to 13,000 villages spread over all regions. Thus, the National Programme for Food Security and Productivity Enhancement, better known as the Crop Maximisation Project phase II (CMPII), started in 2007 with the selection, through the provincial departments of agriculture, of 26 districts and 1,012 villages (Table 1).

Table 1 : Number of CMPII villages by province and district

Province	District	Number of Villages
AJK	Kotli	20
	Poonch	20
Balochistan	Jaffarabad	30
	Killa Saifullah	30
	Khuzadar	30
	Lasbella	30
	Pishin	30
North Western Province	D. I. Khan	32
	Bannu	32
	Charsadda	32
	Peshawar	32
	Swabi	32
North Punjab	Gujranwala	72
	Sargodha	72
	Sialkot	72
South Punjab	Muzaffargarh	72
	Sahiwal	72
	R.Y. Khan	70
Sindh	Khairpur	40
	Larkana	30
	Mirpur Khas	40
	Naushero Feroz	40
	Nawab Shah	40
	Sanghar	40
FANA	Gilgit	1
FATA	Khyber Agency	1
Total		1012

Source: MinFAL

The CMPII aims to maximise crop productivity, improve rural incomes and enhance food security in selected areas. Criteria to select villages include the prevalence of small and medium scale

farmers coupled with conditions favourable to the achievement of improved yields, namely land, irrigation and market infrastructure (for criteria, see box).

Box 1 : Selection criteria for CMPII

- ☞ All villages should be predominantly populated by small and medium farmers. Upper limits for farm size have been set according to Provinces as follows: AJK: 5 acres; NWFP: 15 acres; Punjab: 20 acres; Balochistan and Sindh: 25 acres;
- ☞ Selected villages should have at least 30 small and medium farmers willing to participate in the project;
- ☞ Villages should be selected in a cluster of 30-40 contiguous villages;
- ☞ Villages should not have any soil or environmental ailment;
- ☞ Villages should be located in irrigated areas;
- ☞ Villages should be easily accessible.

Source: MinFAL

The intervention villages have thus been selected in relatively better off areas of rural Pakistan. Indeed, when examining the food security status of selected CMPII districts as described in WFP's "Food Insecurity in Rural Pakistan" study (2003), we observe (Table 2) that a third of the selected villages fall into the most food secure district category.

Table 2 : Number of CMPII villages by province and food security status of district

Province	District Food Security Status					Total
	Extremely Insecure	Very Insecure	Moderately Insecure	Moderately Secure	Relatively Secure	
AJK		20	20			40
Balochistan	60	30	28		32	150
FANA		1				1
FATA	1					1
NWFP	32	32	96			160
Punjab	72		70	72	216	430
Sindh			120	30	80	230
Total	165	83	334	102	328	1012
Total (%)	16%	8%	33%	10%	32%	100%

Source: Crop Bench & Food Security Assessment WFP, 2008

In the framework of the CMPII, a "Crop Benchmark and Food Security Assessment (CB & FSA) Survey" of the 1,012 project villages was planned in order to "establish a baseline mark for crop and animal productivity, input use, availability of animals/livestock, farm implements/tractors, tube-wells, schools, and other assets [and] household expenditure for establishing poverty and food security levels" (MoU, p.3). The survey was designed and implemented by the World Food Programme (WFP) Pakistan Country Office under a Memorandum of Understanding with CPMII, and in close collaboration with the Pakistan Agricultural Research Council (PARC), the Agriculture Policy Institute (API) and CMPII itself.

1.2 Scope of study

The “main objective of the CB & FSA survey [...] is to assess the present levels of inputs being used by small and medium farmers, their productivity levels and household food security status”. (MoU, p.4) Four main outputs are expected from the study, namely:

- ☞ Documenting present input levels being used by small and medium farmers, their productivity levels and household food security status and marketing linkages.
- ☞ Documenting different factors limiting productivity and income generation.
- ☞ Documenting the needs of the farming community for improving productivity and enhancing incomes.
- ☞ Providing recommendations for measures to improve productivity and food security levels. (MoU, p. 5)

As part of the above outputs and despite limitations provided by the nature of the project on which the CB & FSA benchmark survey was implemented (see box 1 and table 2), the study will also attempt to answer the following questions:

- ☞ What are the links between agricultural production and food security in the project area?
- ☞ What type of farmer is more vulnerable to external shocks?
- ☞ Where do more vulnerable farmers live?

The report has produced recommendations for interventions that aim to achieve higher productivity and incomes for small and medium farmers without affecting their vulnerability to external shocks. In this respect, recommendations are used to define the scope of the ‘Smallholder Productivity and Competitiveness Enhancement Programme’ and other medium and long term investment programmes designed in the framework of the UN Joint Initiative on Soaring Food Prices in Pakistan.

Data will be presented by:

- ☞ Geographic location: Given the sample size, analysis has been carried out at Province level. Because of the sample distribution, however, it was decided to aggregate the Federally Administered Northern Areas (FANA) with Azad Jammu and Kashmir (AJK) and the Federally Administered Tribal Areas (FATA) with North Western Frontier Province (NWFP). It was also decided to disaggregate Punjab into North and South Punjab. Analysis is presented for six ‘regions’.
- ☞ Household type: This is determined based on pre-established criteria, such as land size owned and cultivated and on criteria resulting from the analysis of variables collected in the survey (e.g. livelihood groups and wealth quintiles).

1.3 Methodology

The study was carried out in all 1,012 intervention villages of the CMPII. In each village, 12 households were interviewed using a 12-page questionnaire. The questionnaire included questions related to demography, housing and sanitation, income sources, assets, farm input use, crop production and marketing, access to credit and extension, food consumption, income and expenditure, shocks and response to them and child health. Respondents were 99.8% male.

For data collection, WFP entered into a contractual agreement with five national NGOs. Each NGO assigned one or two teams, each comprised of three to four enumerators and one supervisor. Six monitors from MinFAL and WFP undertook three monitoring rounds in randomly selected villages. The field study took approximately forty to fifty days spread over more than two months. The teams had to be recalled during periods preceding and following national political elections. The number of interviews per day was estimated at between 4 and 6 per enumerator.

Data entry took place at CMPII headquarters and was carried out by thirteen data entry clerks over approximately two months.

Data cleaning was done by the VAM unit in the WFP Pakistan Country Office. Analysis and report writing were carried out by an external consultant and the VAM unit of the WFP Pakistan office. Technical support for the analysis was provided by the WFP Food Security Analysis Unit (HQ). The process of data cleaning, analysis and report writing took between 3 and 4 months.

1.4 Sampling

The study teams were expected to interview 12 households in each of the 1,012 CMPII villages, for a total of 12,144 households. In the end, the sample size was 12,122 households distributed in 1,010 villages. Since at the time of the survey the selection of villages to be included in the CMPII was still under way, the number of villages that were covered by the survey in each district (Table 3) slightly differs from their expected number (Table 1).

Table 3 : Number of surveyed villages and households by province and district

Province	District	Number of Villages	Number of HHs
AJK	Kotli	20	239
	Poonch	20	240
Balochistan	Jaffarabad	32	381
	Killa Saifullah	30	360
	Khuzadar	30	361
	Lasbellla	29	348
	Pishin	27	326
North Western Province	D. I. Khan	33	395
	Bannu	30	360
	Charsadda	32	384
	Peshawar	34	408
	Swabi	30	364
North Punjab	Gujranwala	72	866
	Sargodha	72	860
	Sialkot	72	865
South Punjab	Muzaffargarh	70	839
	Sahiwal	71	852
	R.Y. Khan	74	889
Sindh	Khairpur	41	491
	Larkana	30	360
	Mirpur Khas	39	470
	Naushero Feroz	40	481
	Nawab Shah	40	479
	Sanghar	40	480
FANA	Gilgit	1	12
FATA	Khyber Agency	1	12
Total		1,010	12,122

Source: MinFAL

In each village, households were grouped into four groups according to the size of owned land, namely: 0.5 acres or less, 0.5 acres to 5 acres, 5 to 12 acres, 12 acres or more (see Box 1 on selection criteria). Three households were then randomly selected in each group.

1.5 Limitations of study

The analysis was conducted using primary data collected using a questionnaire survey administered to a sample mostly composed of small and medium farmers that were: i) potential participants in a crop improvement programme; ii) living in villages targeted for having better road access and more irrigated or potentially irrigable land. The results of the analysis are, therefore, in line with programme objectives. Conclusions cannot, however, be extrapolated to the wider population in Pakistan.

As far as conception of the survey is concerned, the length and complexity of the questionnaire resulted in some inevitable limitations in its design (e.g., presence of crowded tables, long recall periods, need of conversion by enumerators, etc.). The questionnaire was in English, which may have affected the understanding of some of the questions by enumerators and their capacity to translate them correctly to respondents in the local language. Poor understanding of some definitions may have limited the capacity of enumerators to probe answers. Training of enumerators (2 days) was probably shorter than required. Pre-testing of the questionnaire was, however, carried out in the project area after training.

In terms of statistical representativeness of the results, farmers were stratified on the basis of size of land area owned. Since the proportion of households that fall into each strata in each village is not available, survey results cannot be extrapolated to the whole farmer population in the villages surveyed and should be considered just as indicative of a trend. Furthermore, even within each strata, the random selection of farmers was not always possible due to farmer absence. This could have favoured participation in the interviews of farmers already present in the village or potentially interested in the programme.

During survey implementation, enumerators worked long hours in the field to fulfil targets (2 villages per day). Field work was followed by additional work on the questionnaire in the evening to complete calculations and/or conversions that could not be done on the spot. Nevertheless, estimated interview duration appears unrealistically short, which may signal that some sections may have been rushed. The length and complexity of the questionnaire has probably also been responsible for reported respondent (and enumerator) fatigue during interview and even the discontinuation of interviews by respondents. Finally, the survey was conducted at a time when the wheat harvest was still ongoing and therefore production and yield data often refers to last year.

The complexity of the questionnaire made the data base difficult and long in design. Perhaps because of this, design flaws may have affected data entry. It would have been more appropriate to have two data entry clerks working together and to have the teams control the data tabulations after entry. Furthermore, rounding up and corrections made during data cleaning to rectify inconsistencies in the dataset may have affected some of the variables.

It is likely that data quality of some variables has been affected, in particular where estimates of household size, land, production, prices, income or expenditure were involved. It is also believed that those sections located at the end of the questionnaire may have been less accurately covered due to respondent and enumerator fatigue.

Finally, this survey only provides a static picture at a specific time of the year. Ideally it should have been complemented by qualitative information about the context of the rural economy in survey areas, including the dynamics of access to land or to on and off farm employment opportunities.

2 Conceptual framework for analysis

In order to identify the most effective actions for the programme to take to promote food security in target villages, it is useful to define and link some of the concepts used for survey data analysis. Conventionally, four separate dimensions of food security are considered:

1. **Food availability:** The amount of food physically available to a household (micro level) or at national level (macro level);
2. **Food access:** The physical (e.g. road network, market) and economic (e.g. own production, exchange, purchase) ability of a household to acquire adequate amounts of food; and
3. **Food utilization:** The intra-household use of food accessible and the individual's ability to absorb and use nutrients (e.g. function of health status).

The fourth concept, that of **vulnerability to food insecurity**, reflects the conditions which increase the susceptibility of a household to the effect of hazards on its food security. Vulnerability is a function of a household's exposure to a specific (i.e. flood, drought, etc.) hazard and its coping capacity (or the direct impact of the hazard on the household, mitigated by its coping capacity).

A **hazard** is the potential to cause harm. It can be defined as the probability of occurrence of a potentially damaging phenomenon within a given time period and area¹. Rural households can be exposed to a number of **hazards** (e.g. drought, floods and crop pests are common shocks in Pakistan). The means by which households use available resources and abilities to face adverse consequences that could lead to a disaster define their **coping capacity**. These include liquidating assets (livestock, cash, grain reserves), relying on support from next of kin, temporary migration, etc. Poor households may lack the asset base, the mobility or the social networks to cope with shocks. They are therefore more susceptible, or vulnerable to shock. Exposure to a shock and ability to cope with it are indicators of the degree of **vulnerability to** food shortages that different households face. Coping with a shock has costs and may significantly reduce households' ability to cope with subsequent shocks². Households, particularly the most vulnerable, may try to mitigate the impact of a shock before it occurs and in doing so will use a number of risk minimising strategies, the objective of which is essentially to avoid yearly peaks of expenditure. The result of these risk mitigation strategies, which may include diversifying sources of food and income, strengthening social networks or reducing productive investments is that, more often than not, these households will not take up opportunities to obtain short term gains if they perceive this to increase their vulnerability.

Since in Pakistan most of the literature is based on the analysis of quantitative data within a poverty-oriented framework, it is important to describe the links between food security and poverty.

Poverty is usually measured in monetary terms and defined as the degree of inequality in income distribution between households, either in relation to an agreed benchmark (e.g. one dollar a day or the median household income), or as a measure of statistical dispersion of income or wealth (e.g. the Gini-coefficient). As a result, the vulnerability concept often refers purely to this monetary dimension of poverty. In this context it is taken to measure the variability of consumption expenditures, *“since it is the inability to smooth consumption in the face of income fluctuations which is, to a substantial degree, at the heart of concerns about the role of vulnerability in creating or sustaining poverty”* (World Bank Pakistan Poverty Assessment, p. 28). In Pakistan, vulnerability to weather-related shocks is *“defined as the probability that a household experiences at least one*

¹ WFP, “Comprehensive Food Security Vulnerability Analysis (CFSVA) Guidelines”, 2008 (final draft under publication).

² This includes natural, physical, financial/economic, human and social assets

episode of poverty over a defined time period, and vulnerable households as those for whom this probability exceeds a threshold value” (World Bank Pakistan Poverty Assessment, p. 29). The literature on poverty in Pakistan is therefore, helpful in understanding the conditions that affect the purchasing power of households, particularly the non-farming ones excluded from the scope of the study.

There is nowadays agreement that poverty is not only about economic issues, but involves complex social, political and economic phenomena. In recent years, explanations of poverty have gone beyond conventional definitions of income and consumption to researching aspects of vulnerability of individuals, groups and populations. The UN World Summit on Social Development (1995) defined poverty as “...*a condition characterised by severe deprivation of basic human needs, including food, safe drinking water, sanitation facilities, health, shelter, education and information.*” This concept of poverty includes economic, ecological, infrastructural, social, cultural and political dimensions. Besides more conventional assets, including personal assets such as education, physical assets such as land or economic assets such as cash and food savings, this approach to poverty includes less tangible assets such as available social capital (e.g. family and other social networks or links with the State) and concepts such as security, dignity and autonomy. In doing so, the vulnerability approach attempts to contextualize the processes of poverty, rather than seeing poverty as a static phenomenon.

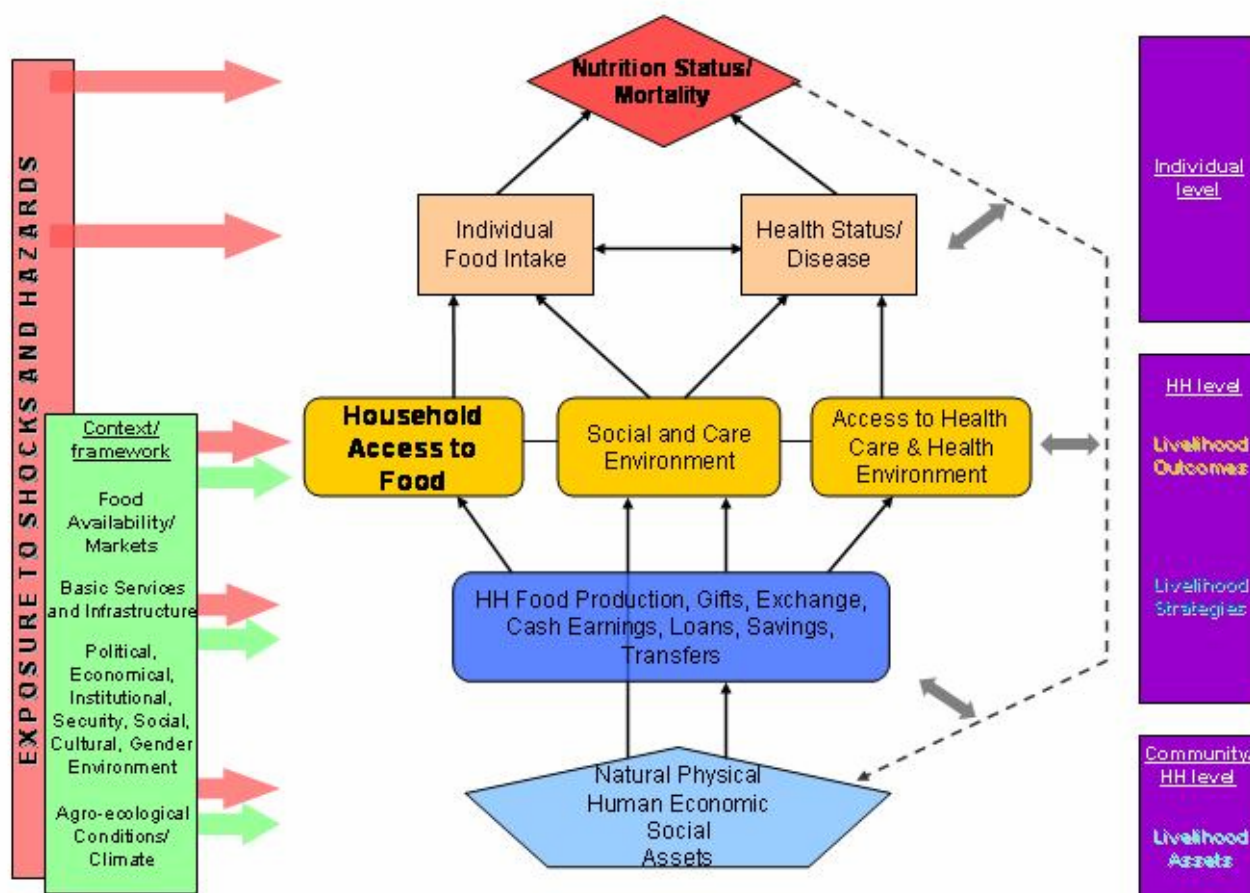
To summarise this discussion, whether we refer to vulnerability to food insecurity or to poverty, the concept of vulnerability has two important features:

- ☞ It defines conditions before a hazard; the risk of becoming poor and/or hungry if a shock occurs.
- ☞ It is a dynamic concept, which means that households that are not vulnerable at some point in time may become vulnerable in future. In this respect, it helps to identify interventions that are more likely to reduce household vulnerability *prior* to a shock as opposed to responding to the needs that *emerge after* the shock in households that have been unable to cope.

Poverty therefore limits household access to, and control over, resources. It limits their capacity to directly produce food or to generate sufficient income to purchase it. It often also restricts households in their ability to rely on social networks, which typically involve some degree of reciprocity. Finally, poverty is likely to affect the nutritional status of individuals not only by restricting their food consumption but also by limiting their access to education and health services.

A conceptual framework on the dimensions of food security and how they interact to contribute to the nutritional status of an individual is depicted in Figure 1. This framework is applied to all the comprehensive food security and vulnerability analyses conducted by WFP.

Figure 1 : Food and Nutrition Security Conceptual framework



(Source: CFSVA guidelines, final draft)

The survey covered small and medium land holders in relatively high agricultural potential areas and therefore provides an opportunity to investigate how agricultural production can contribute to improving food security and which interventions in the agricultural sector are most likely to increase the productivity and income of risk prone smallholder farmers.

The analysis has been structured as follows:

- ☞ Household food production, as well as household purchasing power are considered as indicators of access to food;
- ☞ Own production is determined both by the size of land available to households for farming and land productivity. Attempts will be made to understand the factors that have an effect on productivity and identify measures that can increase agricultural production;
- ☞ The capacity of the household to purchase food will be analysed, looking at income that can be generated on farm (e.g., through sale of crops and livestock products) and off farm. Households' main sources of income will be used to define the homogeneous livelihood groups that are prevalent in survey areas. Other sources of cash such as gifts, loans or sale of assets will be highlighted;
- ☞ Off farm income potential will be assessed by looking at main sources of household income and the employment status of household members;
- ☞ The nutrition status of individuals in a household is the final outcome of what should be an effective food and nutrition security strategy. Since anthropometric data was not collected, the study will look at main determinants of nutritional status at household level: Access to food, health and sanitation services. Health and living conditions will be addressed as part of an analysis of socio-economic conditions. Conclusions will be drawn as to how they could affect nutrition.

3 Food security, poverty and agriculture in Pakistan: literature review

Literature on food security in Pakistan is limited. On the other hand, secondary information on poverty is more readily available and given the close links between poverty and vulnerability, we can attempt to identify the main determinants of food insecurity at household level. The major sources of secondary information are analyses mostly carried out in the framework of World Bank sponsored policy research (see bibliography), that used data from demographic and agricultural sector censuses and from large scale studies such as the Pakistan Social and Living Standards Measurement Survey (PSLM), the Household Income and Expenditure Surveys (HIES) and the Pakistan Rural Household Survey (PRHS). This literature is essentially based on the econometric analysis of quantitative data collected through large questionnaire surveys and therefore does not include a qualitative description of the dynamics of local economies such as factors determining access to land, social relationships between the poorest and the better off, or seasonality that may affect employment.

Box 2 : PSLM, HIES and PDHS

The Pakistan Social and Living Standards Measurement Survey (PSLM) was carried out nationwide in 2004-05. It collected simple welfare indicators, indicators of access and use of public services and level of satisfaction with those services, using the standard Core Welfare Indicator Questionnaire (CWIQ). The PSLM is based on a sample size of about 76,500 households, which allows to disaggregate welfare indicators at District level.

Household Integrated Economic Surveys (HIES) have been carried out in Pakistan since 1963, the latest being in 2004-05. HIES collects very detailed information on household characteristics, including income and expenditure levels. Its sample size however, about 16,000 households, allows to draw reliable estimates of key indicators only at national level and rural/urban disaggregated data.

The Pakistan Rural Household Survey (PRHS) is a representative rural survey implemented every 3-4 years, the last round of which was conducted in 2004-05 in 17 districts in all 4 provinces. It covered roughly 2,700 households.

According to the World Bank, *“Land, particularly irrigated land, is the most important productive asset in rural Pakistan and a major determinant of social status, political influence and income. Land ownership provides access to political power and public incomes for large landowners, and has considerable pecuniary and non pecuniary, often invisible, associated returns.”* (Rural Factor Markets (RFM) study, 2004, p. 10). The first obvious benefit is that farmers who have access to irrigation can grow two crops per year and can supplement rainfall during the monsoon (*kharif*) season.

Land ownership in Pakistan is extremely skewed. The Gini-coefficient for land concentration derived from Pakistan Rural Household Survey (PRHS, 2001) data is equal to 0.78 (it varies from 0.75 in Balochistan to 0.91 in Sindh)³. Indeed, *“According to the 2000 Agricultural Census, only 37 percent of rural households owned land, and 61 percent of land-owning households owned less than 5 acres, or 15 percent of total land. Two percent of households owned 50 acres, or 30 percent of total land”* (World Bank Pakistan - Promoting Rural Growth and Poverty Reduction, 2007).

³ The Gini coefficient is defined as a ratio with values between 0 and 1: A low Gini coefficient indicates more equal income or wealth distribution, while a high Gini coefficient indicates more unequal distribution.

Average holding size is reported to vary between 1.8 acres in Southern Punjab and 6.7 acres in Sindh (Pakistan Poverty Assessment, 2002).

“The majority of Pakistan’s rural poor are neither tenant farmers nor farm owners” as stated in a recent study from the World Bank⁴. *“Non-farm households (excluding agricultural laborer households) accounted for slightly over half (57 percent) of the rural poor in 2004-05. Farmers comprised only 35 percent of households in the bottom 40 percent of rural per capita expenditure distribution. The remainder (8 percent) were agricultural labourer households. This distribution of rural poverty closely reflects land distribution, which is highly unequal in Pakistan. Moreover, returns to land are estimated to be about half of incomes (value added) from crop agriculture, with only about five percent of value added paid to hired agricultural labour.”* (World Bank Pakistan - Promoting Rural Growth and Poverty Reduction, 2007)

It seems that *“Inequality in asset ownership, particularly land, may be far more than a distributional concern; it may affect productivity.”* (World Bank, Pakistan Poverty Assessment, 2002). This is probably because larger farmers will try to maximise returns to capital and labour rather than to land. Indeed, a recent analysis using 2000 agricultural census data consistently shows that, accounting for all other factors, increases in household operated land cause farm (wheat and rice) yields, net revenues and gross output to decrease. Coady (1995) finds that *“access [to fertilizer] is positively correlated with farm size but that, among users, per-acre fertilizer levels decrease with farm size. [...] results suggest that [...] the presence of increasing relative risk aversion means that the net relationship between farm size and fertilizer intensity is negative. This latter appears to dominate any tendency for having higher fertilizer intensity on larger farms arising from better knowledge or irrigation facilities.”*

On the other hand, the productivity of farmers is also constrained by their lower incentives to invest in the land if they are tenants or sharecroppers (see section on tenancy) and their exclusion from the *“formal credit market which could finance precisely the long term productive investments in land and agricultural machinery that can raise them out of poverty.”* (World Bank, Pakistan Poverty Assessment, 2002).

Secondary data on wheat yields provided by the Pakistan Ministry of Food, Agriculture and Livestock (table 4) for 2005-06 and 2006-07, show substantial differences between Provinces and between irrigated and un-irrigated land. The highest yields, especially under irrigation, are found in Sindh, where they are reported to be double those in North Western Frontier Province (NWFP). In

Table 4 : Average wheat yield (Kg/ha) from irrigated and un-irrigated lands by province

	wheat yield (Kg/ha)			
	2005-2006		2006-07	
Province	Irrigated	Unirrigated	Irrigated	Unirrigated
Balochistan	2,277	0	2,265	1,147
NWFP	2,007	1,167	2,018	1,196
Punjab	2,726	1,354	2,902	1,755
Sindh	2,980	1,366	3,556	1,717

Source: MinFAL, Agriculture Statistics of Pakistan, 2006-07

general terms, wheat yields under irrigation are roughly double those in rain fed conditions.

According to the Ministry of Food, Agriculture and Livestock (MinFAL), wheat yields in Pakistan are reported to be below world averages for a number of reasons, including⁵:

- ☞ Low farm gate prices, which do not provide adequate incentives to invest in wheat production.
- ☞ Technical and technological inefficiencies, which are *“mainly attributed to tenant arrangements and farm size”*.

⁴ The World Bank, Pakistan - Promoting Rural Growth and Poverty Reduction, SDU/SAP, March 2007; data is derived mostly from the 2004-2005 Pakistan Social and Living Standards Measurement (PSLM) Survey.

⁵ Source: MinFAL, 2008, pp. 37-39.

- ☞ Limited access to credit by smallholders.
- ☞ Unreliability of water supply.
- ☞ *“Shortage of good quality, high-yielding, insect and pest resistant varieties of wheat seeds”*.
- ☞ Limited use of ‘advanced’ technologies and agronomic practices, *“primarily due to lack of awareness, resources, non-viable farm sizes, low level of formal education and training”*.
- ☞ *“Ineffective extension services”*.
- ☞ Weak farmer networks.
- ☞ *“lack of balanced use of fertilizer”*: Despite the fact that wheat is reported to consume about 50 percent of all fertilizer applied to crops, little Phosphorus and Potassium are apparently used to complement Nitrogen applications.
- ☞ Overlapping between the cultivation period of wheat and cotton or rice, which could be minimised by implementing reduced or zero tillage technologies.
- ☞ Post harvest losses, estimated at between 15 and 20 percent.

Not all studies on poverty in Pakistan agree on the importance of the links between poverty and land ownership, whereby the landless and smallholder farmers account for the majority of the rural poor. Indeed, *“land ownership is only part of the story of rural poverty in Pakistan. [...] Overall, rural households derive an average of 44 percent of their income from non-agricultural sources, including non-farm wage earnings, non-farm enterprise income, remittances, and others.”* (World Bank, Pakistan Poverty Assessment, 2002)

According to the 1990 Agricultural Census, family workers represented 72 percent and tenant farmers 25 percent of the agricultural labour force. Casual labourers accounted for only 0.8 percent of the total, indicating only limited employment of casual labour and usually *“only in periods of peak labour demand for seasonal activities such as transplanting (paddy) and harvesting.”* (World Bank, RFM, p. 37).

“In the rural non-farm sector, [...] wage workers are the dominant type of labourers (65 percent of rural non-farm employment in the 1999-2000 Labour Force Survey); self employed and unpaid family labour account for only 33 percent of rural non-farm employment. [...] Only 7 percent of these informal sector employees in 1999-2000 were female. Most of the employment is in the informal sector (68 percent) and involves low-skilled jobs. The other third of the non-farm labour force is employed by the formal sector (registered firms), under either a permanent or fixed-term contract basis [mostly in large scale manufacturing].” (World Bank, RFM, p. 37)

As far as gaining employment in urban areas is concerned, this presupposes that households members are able to move from their areas of origin. *“According to HIES (1998-99), 30 percent of current urban residents are migrants. Among them [...] 59 percent moved from rural areas. [...] The available literature on migration indicates that age and education are important determinants of migration.”* (World Bank, RFM, p. 38) The rural poor are often restricted in their ability to move to urban areas in search of work because migration involves costs and their low education levels will always direct them towards low-skilled, low-income jobs.

“Remittances in general tend to reduce participation in paid-farm jobs but have no significant effect on non-farm employment. Foreign remittances (which are typically large relative to local wages) tend to reduce participation in non-farm employment. This finding is consistent with [research which indicates] that foreign remittances tend to be invested in physical assets, suggesting that households that receive foreign remittances can increase labour productivity in own-farm or family enterprises.” (World Bank, RFM, p. 36)

Finally, the study of the impact of high food prices on rural and urban socio-economic conditions and livelihoods in Pakistan offers some insights into the current food security situation. Though given its sample size and sampling methodology, *“no extrapolation to a wider population can be*

done on the basis of the data; neither is the quantification of observed trends possible" (United Nations Joint Assessment Mission Price Study 2008, p. 8), the study has a more balanced perspective of food security in rural Pakistan by including landless households in the analysis.

The Price Study shows that *"Households cope differently with price shocks, however most widespread are changes in the quality and quantity of food consumed"*. The survey shows that 40 % of interviewed households in both urban and rural areas shifted consumption to less preferred food, including shifting from rice to cheaper wheat. A more harmful measure is limiting portion sizes at meals, which one fourth of households are doing. In rural areas, adults reduce their food share for the benefit of their children.

The number of meals eaten per day has changed. According to survey findings, more than 10% of adults and children are eating fewer meals per day than six months ago. The majority of adults reported having two meals per day, while $\frac{3}{4}$ of children have 3 to 4 meals per day. A worrying finding is that $\frac{1}{5}$ of adults eat only once a day.

Simulation results show an increase in the share of the severely food insecure population, from 23 % in 2005-06 to 28% in 2008. The share of moderately food insecure people, who consume more than 1,700 but less than the international minimum threshold of 2,100 kilocalories/capita/day, changed only slightly during the same period. Even among the population who manage to reach the minimum kcal intake, a significant share is likely to still have an inadequate diet in terms of nutrient intake.

This household survey sheds some light on this. During the interview, households were asked to recall what food items they consumed over the last seven days. Diet diversity is a good indicator of the adequacy of food intake. Overall, more than a quarter of households were found to have poor food consumption, which means an inadequate diet in terms of quantity and quality. This percentage translates into 40 million people, if extrapolated to the population of Pakistan, and is very similar to the HIES simulation result of 27% below 1,700 kcal.

The percentage of households with poor food consumption is slightly higher in rural areas, whereas the HIES results show a higher share with poor food consumption in urban areas. This difference can be explained by the fact that the survey approach method (food frequency and diversity measurement) captures diet diversity, whereas the HIES data only analyses actual kcal intake, which is slightly better in rural areas.

Rural non farming households are most affected by the cereal price inflation as their food basket contains a larger share of rice and wheat than the one of urban households and they cannot rely on own production. Almost two thirds of them have a borderline diet that is inadequate in terms of quality, but not necessarily in terms of quantity or kcal intake. In urban areas, the share goes up to $\frac{3}{4}$ of households. Only a small share of interviewed households (< 10%) consume an adequate diet that provides not only the energy, but also the macro and micronutrients required for a healthy life. (United Nations Joint Assessment Mission, June 2008, p. 28).

4 Description of the area

4.1 Demographic profile of households

The definition of a household used for the study is: “those people who have common kitchen/bread”, i.e. pool their income and have joint expenditure for food and non food.

Within one household, it is possible that a person other than the household head takes decisions concerning agricultural production. In particular, when the household head is too old, it is likely that the eldest son in the household takes over decision making powers regarding the farm. For this reason, basic demographic information has been collected on both the household head and the farm-decision maker.

4.1.1.1 Size of household

Household size is an important variable in food security analysis as it directly influences the amount of food that has either to be produced or obtained from outside sources. It must however be analysed in conjunction with other human asset indicators which also measure the potential capacity of the household to produce sufficient food or to gain sufficient income to fulfil its needs (e.g. dependency ratio, percentage of dependents, employment status, literacy and education levels of members). Table 5 and 6 report the average number of household members in each Province. Results are disaggregated by sex and age category.

Table 5A : Average number of household members by sex and province

Province	Males	Females	Total
AJK & FANA	5.0	4.4	9.4
Balochistan	5.6	5.0	10.6
NWFP & FATA	5.8	5.2	11.0
North Punjab	4.1	3.6	7.6
South Punjab	4.5	4.1	8.6
Sindh	4.9	4.4	9.3
Total	4.9	4.4	9.3

Source: Pakistan Crop Benchmark & Food Security Assessment WFP, 2008

Table 5B: Average number of household members by land category

	% of respondents	family size
Landless	20	8.9
From 1/2 to 5 acres	36	8.9
From >5 up to 12 acres	27	9.4
>12 up to 20 Acres	17	9.9
Total	100	9.3

Table 6 : Average number of household members by age group and province

Province	<1y	1-4y	5-9y	10-14y	15-49y	50-64y	over64y	Total
AJK & FANA	0.2	0.9	1.3	1.2	4.7	0.8	0.4	9.4
Balochistan	0.5	1.7	1.7	1.4	4.4	0.8	0.2	10.6
NWFP & FATA	0.4	1.3	1.6	1.3	5.2	1.0	0.3	11.0
North Punjab	0.2	0.6	0.8	1.0	3.7	0.9	0.4	7.6
South Punjab	0.3	0.9	1.1	1.1	4.1	0.7	0.3	8.6
Sindh	0.4	1.3	1.4	1.2	4.1	0.8	0.2	9.3
Total	0.3	1.1	1.3	1.2	4.3	0.8	0.3	9.3

Source: Pakistan Crop Benchmark & Food Security Assessment, WFP, 2008

There is a palpable difference between the results from this Crop Bench & Food Security Assessment (CB & FSA) (2008) and the latest Household Income and Expenditure Survey (HIES) for 2005-2006. In the HIES, the average number of household members for rural Pakistan is 6.9 (3.4 males and 3.5 females), in the range of previous HIES surveys. Such estimates differ significantly from the 9.3 members found in the CB & FSA survey (4.9 males and 4.4 females).

When comparing the data sets by age category⁶, however, the proportion of household members in each category (Table 7) appears relatively similar. The same occurs if we compare the percentage of dependents (45 percent of dependants according to the CB & FSA; 46 percent of dependents according to HIES).

Table 7 : Distribution of household members per age class: comparison between Pakistan Crop Benchmark & Food Security Assessment and HIES (2005-06) surveys (%)

	<1y	1-4y	5-9y	10-14y	15-49y	50-64y	over645y	Total
Pak CB&FSA	3.4	12.0	13.8	12.6	46.1	8.9	3.2	100.0
HIES	2.4	10.8	15.2	13.3	45.9	8.4	3.9	100.0

Source: Pakistan Crop Benchmark & Food Security Assessment and HIES (2005-06)

It has been noted that the HIES is careful to count “household members who ‘usually live and eat here’ [and not to] list guests, visitors etc.” (HIES “male” questionnaire, p. 3) This discrepancy may indicate that there are, in Pakistan, important inter-household movements. It is possible that the

Table 8 : Distribution of household members per sex: Comparison between the Pakistan Crop Benchmark & Food Security Assessment and HIES (2005-06) surveys (%)

	Male	Female
CB&FSA	52.8	47.2
HIES	50.4	49.6

Source: Pakistan CB & FSA (2008) and HIES (2005-06)

study has included people living temporarily in the household, though no information is available on the duration of this extra presence.

The CB & FSA data shows a significantly higher proportion of male members compared with the HIES data (Table 8). This may support the hypothesis that the CB & FSA has recorded adult males that temporarily joined

the household to help with the wheat or sugarcane harvest.

4.1.1.2 Dependency ratio

The dependency ratio is the proportion between dependents and active household members⁷. Dependents are defined as household members below the age of 15 and above the age of 64. At aggregate level, the age dependency ratio indicates areas and/or categories of households that might be burdened by a high proportion of dependents over active members. Areas with a high average dependency ratio might be characterised by higher migration of adult productive members, or prevalence of diseases that affect the adult population.

Table 9 : Average dependency ratio by Province

Province	Mean
AJK & FANA	0.8
Balochistan	1.2
NWFP & FATA	0.9
North Punjab	0.8
South Punjab	1.0
Sindh	1.1
Total	1.0

Source: Crop Bench & Food Security Assessment WFP, 2008

In Pakistan the dependency ratio probably hides the extensive presence of child labour. Indeed, “according to the 1999-2000 Labour Force Survey, [...] In rural areas, 21.7 percent of boys age 10-14 were involved in the labour force, compared with only 2.7 percent of girls.” (World Bank, RFM study, p. 40).

Data from the Pakistan CB & FSA (Table 9) show that on average, Balochistan is the province with the highest dependency ratio (1.2), while North Punjab has the lowest ratio (0.8).

⁶ In this case, the 2005-06 HIES data include both urban and rural areas

⁷ The dependency ratio is equal to the number of individuals aged below 15 or above 64 divided by the number of individuals aged 15 to 64 (it can be expressed as a percentage). Because, households with no active members would give an invalid result, this indicator is only computed at aggregate level (i.e., Province or District).

4.1.1.3 Age of HH

The age of the household head was also taken into consideration since this variable could have an influence on food security. In particular, very young household heads might be vulnerable because they have fewer assets or lower access to productive factors. Very old heads may also be vulnerable if they do not have sufficient active family members to support them.

According to the survey data (Table 10), heads of households are on average relatively young (46 years for the entire sample), with substantial differences between provinces (e.g. 52 years in AJK & FANA and 40 years in Balochistan). These figures probably reflect low life expectancy in rural areas of Pakistan, particularly in Balochistan.

4.1.1.4 Sex of HH

Out of a total of 12,122 households, only 45 households declared that their head is a female (0.4%). 36 households out of 5,020 are in Punjab. Most female headed households are “concentrated” in two districts, namely Sahiwal (South Punjab, 16 out of 814) and Sargodha (North Punjab, 12 out of 825). *The low number of cases did not allow the analysis of data according to gender of the household head.*

According to the data, all the female heads of household have a spouse. It is likely that a married woman has been declared “household head” if the husband was abroad or absent long enough to let the woman be in charge of household matters.

4.1.1.5 Literacy level of household head and spouse

The literacy level of the household head is an important human asset indicator. Indeed, it can influence the production and income capacity of the whole household (access). The literacy level of the head’s spouse is also important because it likely affects the quality of consumption within the household (utilization).

The question “*can the household head / spouse read and write a simple message in any language?*” gives an indication of literacy levels of the household head and of his spouse. Since only 45 households were headed by a woman, the literacy level of the heads closely matches the literacy level of men, while data for the spouse correspond to the literacy level of women.

Table 12: Percentage of households where the head and spouse are able to read and write a simple message in any language, by province (%)

Province	% HH where the head is literate	% HH where the spouse is literate
AJK & FANA	71	23
Balochistan	45	7
NWFP & FATA	44	12
North Punjab	72	42
South Punjab	66	32
Sindh	67	15
Total	61	23

Source: Pakistan Crop Benchmark & Food Security Assessment WFP, 2008

Table 10 : Mean age of household head by Province

Region	Mean
AJK & FANA	52
Balochistan	40
NWFP & FATA	48
North Punjab	50
South Punjab	45
Sindh	45
Total	46

Source: Crop Bench & Food Security Assessment, WFP, 2008

Table 11 : Percentage of households where the head and spouse are able to read and write a simple message in any language

	% HH where the head is literate	% HH where the spouse is literate
Yes	61	23
No	39	77
Total	100	100

Source: Pakistan Crop Benchmark & Food Security Assessment WFP, 2008

Overall, literacy levels show that nearly two thirds of males can “read and write a simple message in any language”, while less than a quarter of females can do so.

The data shows important differences by Province (Table 12). In particular, literacy rates for both household heads and their

spouses appear to be much lower in Balochistan and NWFP & FATA than in other Provinces, while for spouses Sindh also shows very low values.

The literacy level of the household head and his/her spouse have been combined (Table 13) in order to produce a proxy indicator of the level of education of the household. As expected, Balochistan and NWFP & FATA have the lowest literacy levels, with over half of the households in the sample

Table 13 : Distribution of households by literacy level of household head and spouse, by province

Region	Percentage of HHS by literacy level of the HH head and spouse		
	low (none can read and write)	medium (only one can read and write)	good (both can read and write)
AJK & FANA	29	49	22
Balochistan	54	39	7
NWFP & FATA	56	32	12
South Punjab	29	44	27
North Punjab	26	34	40
Sindh	32	54	14
Total	37	42	21

Source: Pakistan Crop Benchmark & Food Security Assessment WFP, 2008

in the 'low' category. Due to the low level of literacy of the spouse, only 14 percent of households in Sindh have 'good' aggregate literacy levels.

North Punjab shows the highest percentage of households with good literacy level (40 percent), followed by South Punjab and AJK & FANA (27 percent and 22 percent respectively).

4.1.1.6 Age and education of farm decision maker

It is possible than when the household head becomes too old, the eldest son takes over decision making on the farm. Therefore, it is expected that on average farm decision makers are younger than household decision makers. This is confirmed by the data. However, the difference is so small that it is likely that most household heads also take decisions over farming issues.

Table 14 : Mean age of farm decision-maker by province

Province	Mean age of farm decision-maker	Mean age of household head
AJK & FANA	50.6	52
Balochistan	36.8	40
NWFP & FATA	46.6	48
North Punjab	48.9	50
South Punjab	43.4	45
Sindh	44.6	45
Total	44.7	46

Source: Pakistan Crop Benchmark & Food Security Assessment WFP, 2008

The education level of the farm decision-maker was also assessed. This variable is of interest particularly for its possible relationship with the use of mechanisation and inputs, yields and income. Since it can be presumed that in most cases the household head is also the farm decision-maker, this variable can also be used to explore the possible effects of education on the food security status of the household. Several categories of education were recorded (Table 15).

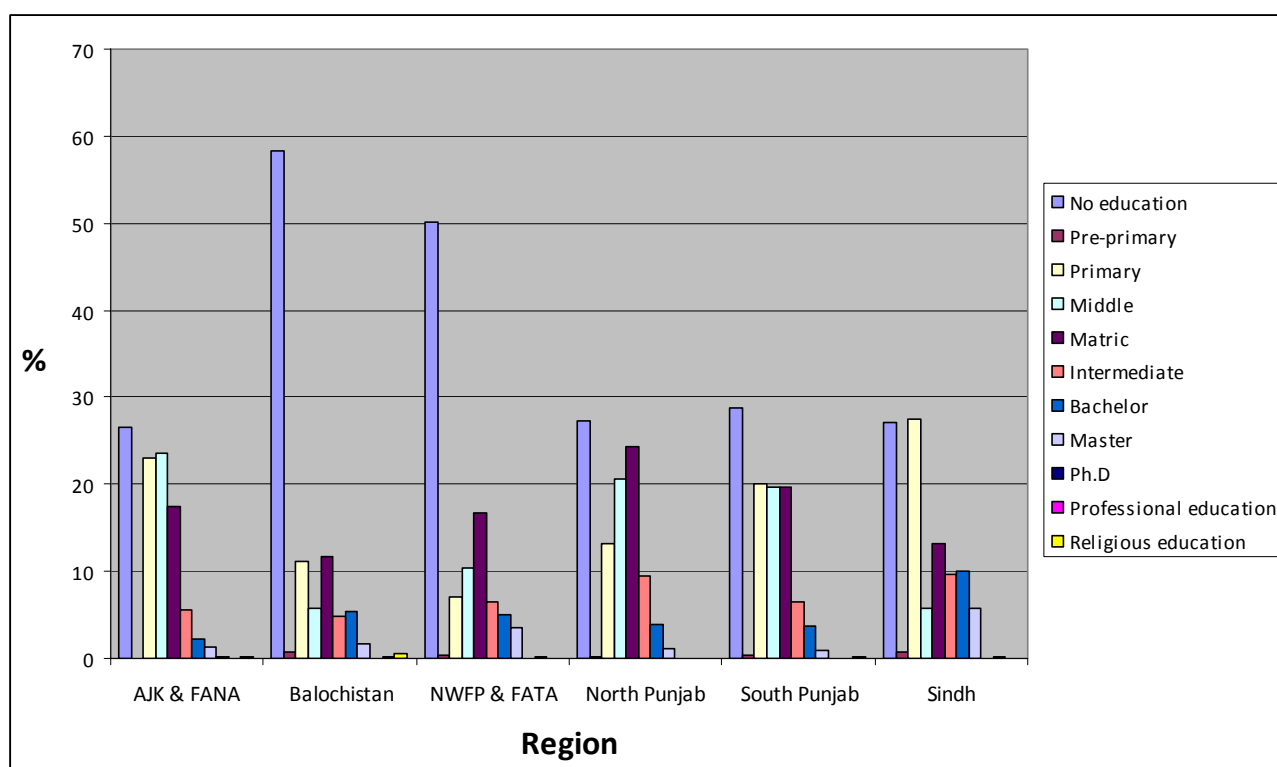
Table 15 : Level of education : categories and description

Level of education	Description
No education	implies no schooling
Pre-primary school	equivalent to kindergarten, known as <i>kachi</i>
Primary school	1 to 5 years
Middle school	6 to 8 years
Matric	9 to 10 years
Intermediary	11 to 12 years
Bachelor	13 to 14 years
Masters	15 to 16 years
PhD	Masters + 3
Professional education	MBBS, Engineer, etc...
Religious school	<i>dini madaress</i>

Figure 2 shows that 35 percent of all farm decision-makers in the sample have no formal education and a further 17 percent only have primary education. The fact that 8 percent of the total sample declare having a university bachelor or a master degree perhaps confirms that the sample may be skewed towards more educated, better off farmers.

Farm decision makers without any formal education are more frequent in Balochistan (55 percent) and NWFP & FATA (49 percent). Sindh is the Province with most university bachelors and master degrees (16 percent).

Figure 2 : Level of education of farm decision maker, by Province



4.2 Household Productive Assets

Household assets were divided into three main categories: land, farm power and livestock. No sufficient data was available on farm implements.

4.2.1 Land

4.2.1.1 Land size

The survey looked at the size of land owned, leased and at the total operational area (which also corresponds to cultivated land). Table 16 shows that while the average size of the operational area is less than 2 acres in AJK, it is about 10 acres in Punjab.

It is important to note that the sample was stratified according to land size owned and that the same number of households were selected in each category. The four categories for land ownership were: 0.5 acres or less (landless), 0.5 acres to 5 acres, 5 to 12 acres, and more than 12 acres up to the limit set for each Province⁸.

Because of the sampling strategy, the distribution of households by land ownership does not reflect the distribution in the entire population.

⁸ All farm sizes below one acre were later recoded as owning, leasing or cultivating no land.

Table 16 : Average owned, leased in and operational holding area by region

Region	Owned	Leased in	Operational area
AJK & FANA	1.9	0.0	1.9
Balochistan	7.4	0.8	8.2
NWFP & FATA	5.1	1.0	6.1
North Punjab	6.9	2.7	9.6
South Punjab	7.8	2.3	10.1
Sindh	6.5	1.0	7.5
Total	6.6	1.6	8.1

Source: Pakistan Crop Benchmark & Food Security Assessment WFP, 2008

Table 17 : Distribution of households (%) by land ownership category and by province

Province	Percentage of Households				
	1 acre or less	From 1.1 to 5 acres	From 5.1 to 12 acres	12.1 acres or more	Total
AJK & FANA	29.3	68.6	1.6	0.4	100
Balochistan	23.0	28.6	29.9	18.5	100
NWFP & FATA	19.0	44.9	23.3	12.7	100
North Punjab	18.8	34.7	28.9	17.6	100
South Punjab	21.3	29.0	28.1	21.5	100
Sindh	18.4	36.9	28.9	15.8	100
Total	20.3	36.1	26.9	16.7	100

Source: Pakistan Crop Benchmark & Food Security Assessment WFP, 2008

because the sampling methodologies and definitions used in the two surveys differ. However, it looks like the prevalence of land-owning households with less than 5 acres found in the CB & FSA study (56 percent) is close to the figure (61 percent) derived from the 2000 agricultural census.

Table 18 : Distribution of households (%) by size of operational / cultivated land, by province

Province	Percentage of Households				
	1 acre or less	From 1.1 to 5 acres	From 5.1 to 12 acres	12.1 acres or more	Total
AJK & FANA	27.9	70.1	1.6	0.4	100
Balochistan	15.8	30.9	31.8	21.5	100
NWFP & FATA	4.3	52.3	28.9	14.6	100
North Punjab	5.9	34.2	33.9	26.0	100
South Punjab	4.7	33.6	32.9	28.8	100
Sindh	2.6	46.8	33.2	17.4	100
Total	7.0	40.8	31.1	21.1	100

Source: Pakistan Crop Benchmark & Food Security Assessment WFP, 2008

A different picture emerges if we look at operational / cultivated land (Table 18). There is a significant shift of the sample towards larger farmers, with only 7 percent of all households falling in the smallest land cultivation category. This is probably indicative of a bias towards relatively larger farmers induced by the objectives of the CMP II project and the methodology of the study.

4.2.1.2 Tenancy

Several categories of household according to tenancy status of land cultivated were distinguished in the study:

Owner: A household that owns the entire land under cultivation;

⁹ Visits to Poonch district confirm that very few landless exist and that most of the households hold plots below 5 acres.

Tenant: A household who takes the entire land under cultivation from other household(s) against a fixed rent in cash/ kind. Tenancy involves a long term agreement between two households;

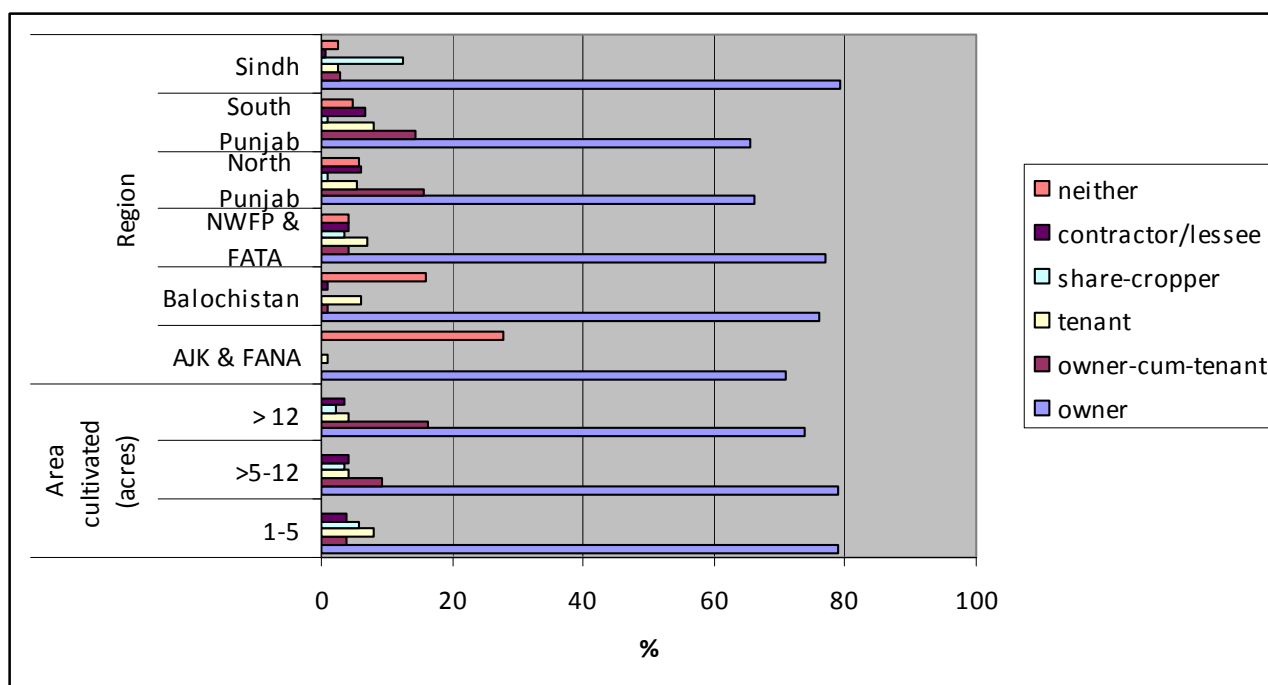
Owner-Cum-Tenant: A household that owns part of the area under cultivation while renting the remaining from other household(s) against a fixed payment;

Share-cropper: A household that takes the entire land under cultivation from other household(s) against a share in the produce;

Contractor/lessee: A household who takes the entire land under cultivation from other household(s) against a fixed rent in cash/ kind. The difference with tenancy is that there is no long term relationship between landlord and lessee.

Most households in the sample are either owners of all the cultivated land, or owners who rent additional land (Figure 3). Data shows that there is a slight decrease in the proportion of tenants and sharecroppers with increasing size of land cultivated. About 15 percent of households in Punjab declared being owners-cum-tenants while the proportion of sharecroppers is much higher in Sindh than in other Provinces.

Figure 3 : Distribution of households (%) by tenancy arrangements (by Province and size of land cultivated.)



Source: Pakistan Crop Benchmark & Food Security Assessment Report, WFP, 2008

4.2.1.3 Irrigation

As mentioned earlier, access to irrigation is the **most** important pre-requisite in rural Pakistan since it offers farmers the opportunity to cultivate in winter (*rabi*) and to supplement rainfall during the monsoon (*kharif*) season.

Table 19 : Total irrigated area (million ha) and distribution of irrigated area according to type of irrigation (by province)

Province	Irrigated area by type of irrigation system						Total irrigated are (million Ha)
	Canals	Tubewells	Canals & Tubewells	Wells	Others	Total	
NWFP	81.9	8.5	1.1	4.3	4.3	100	0.9
Punjab	26.7	19.8	51.4	1.8	0.3	100	14.0
Sindh	91.8	8.2	0.0	0.0	0.0	100	2.1
Tot. Pakistan	38.6	18.5	40.1	1.8	1.0	100	18.0

Source: Agricultural Statistics of Pakistan, in M.H. Khan (2006)

According to estimates based on official statistics (Table 19) in 2002, the area cropped during the *rabi* season was 54 percent of the total, against 44 percent in the *kharif* season, with a further 2 percent under orchards.

CB & FSA data (Tables 20 and 21) show that, with the exception of AJK & FANA and Balochistan, in the other provinces almost all sampled farmers irrigate their land in both seasons. In Balochistan, 21 percent of farmers do not irrigate at all, while 7 percent irrigate at least in one of the two seasons.

It is important to report that, while in AJK & FANA virtually no farmers declared irrigating the land, field visits to Poonch district revealed that a substantial portion of the agricultural land in the study area lies along river banks and is under rice production. Also, data on land cultivated under different crops show that this province has the highest cropping intensity (see paragraph on cropping patterns). Since irrigation is practiced by diverting river water through non permanent structures, it is possible that farmers and/or enumerators have been unable to record this type of irrigation under any of the given categories. Another possibility is that farmers may have been unwilling to declare that they already irrigate land in fear that this may prevent the project from constructing new irrigation structures in the area.

Table 20 : Proportion of households (%) by irrigation status, by Province

Province	Percentage of Households			
	No irrigation	Irrigation 1 season	Irrigation 2 seasons	Total
AJK & FANA	99	0	1	100
Balochistan	21	7	73	100
NWFP & FATA	5	0	95	100
North Punjab	6	1	93	100
South Punjab	5	0	95	100
Sindh	3	0	97	100
Total	11	1	88	100

Source: Crop Benchmark & Food Security Assessment, WFP, 2008

Table 21 : Average proportion of operational holding area irrigated during the *rabi* and *kharif* seasons, by Province (%)

Province	Rabi	Kharif
AJK & FANA	1	1
Balochistan	84	91
NWFP & FATA	92	94
South Punjab	97	97
North Punjab	94	98
Sindh	98	98
Total	91	93

4.2.2 Farm Power

The main sources of farm power are tractors and bullocks. Table 22 describes the prevalence of households in the sample that own at least one tractor or one bullock.

Punjab (North and South) is the only Province where tractor ownership is more significant, with between one fourth and one fifth of households in the sample owning at least one tractor.

Table 22 : Prevalence of households (%) with at least one tractor or a bullock, by Province

Province	Percentage of Households	
	With at least one tractor	With at least one bullock
AJK & FANA	2	8
Balochistan	5	9
NWFP & FATA	4	12
North Punjab	19	6
South Punjab	23	10
Sindh	4	7
Total	11	9

Source: Crop Benchmark & Food Security Assessment, WFP, 2008

Table 23 : Prevalence of households (%) with at least one tractor or a bullock, by owned land size

land owned (acres)	at least one tractor	at least 1 bullock
< 1 acre	7	14
1.1-5 acres	6	5
5.1-12 acres	14	8
12 acres or more	25	9

Source: Crop Benchmark & Food Security Assessment, WFP, 2008

As expected, tractor ownership increases with size of land owned (Table 23). A quarter of households in the largest land size category own at least one tractor. It is interesting to note that 7 percent of households owning less than one acre also own a tractor, suggesting that these households derive additional income by renting the tractor out.

4.2.3 Livestock

“In most areas of Pakistan, livestock husbandry is closely integrated with crop production. The primary purpose of livestock is to meet the dietary needs of the household and draft requirements on and off farm, generate cash income, and provide insurance to cushion income shocks. This is well reflected by the fact that livestock is owned quite widely by farm and non-farm households. The herds are generally very small and depend largely on the local supply of fodder, grazing grounds and farm and household waste products.” (Khan, 2006, p.133)

Until the spread of tractors, oxen were mostly used for draft, while cows and buffaloes were traditionally kept for milk production. According to Khan, *“the production system for large ruminants, especially for milk, can be subdivided into four distinct systems”* (Khan, 2006, p.137). The distinction between these is based on the number of cows/buffaloes owned, on the management system and, for commercial farms, whether they are situated in rural or peri-urban areas. The categories proposed by Khan were adapted to fit the characteristics of the survey area and the following four categories were thus defined:

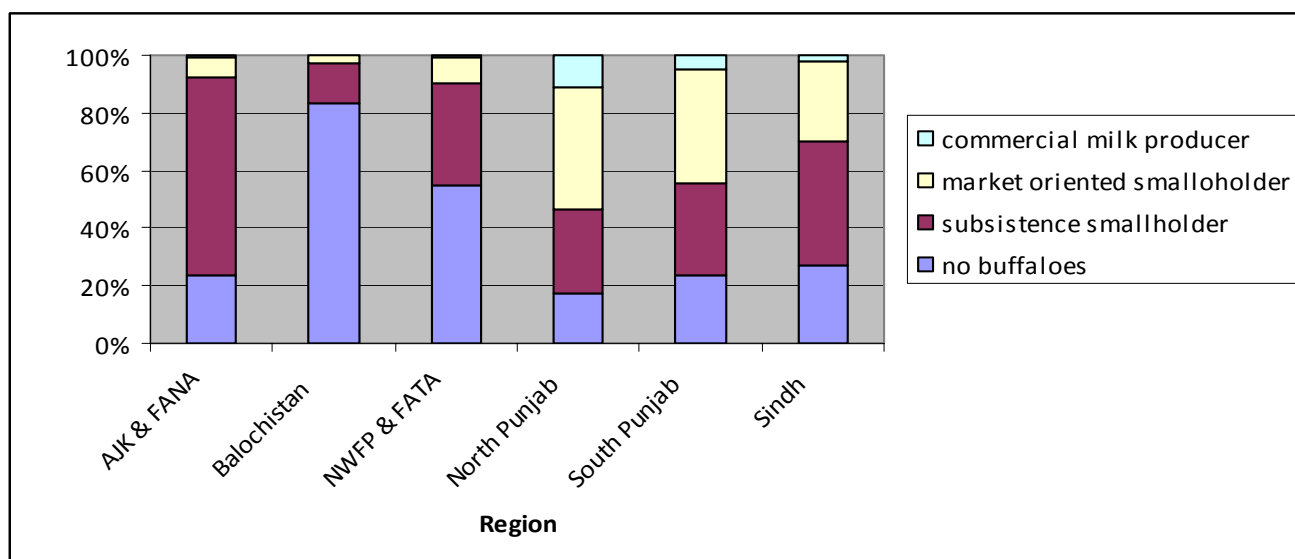
- ☞ ‘No buffaloes’/cows: households that do not have any buffaloes/cows;
- ☞ ‘subsistence smallholders’: households that keep from one to three buffaloes/cows, whose milk production is consumed by the family. *“Family labour, particularly of children and women, and local grazing, supplemented by green fodder, straw and small quantity of concentrate given to milking cows, sustain the system.”* (Khan, 2006, p.137)
- ☞ ‘market oriented smallholders’: these households keep from four to ten buffaloes/cows. *“Milk animals are stall fed with seasonal green fodder, straw and concentrate; dry cows and the rest are grazed. Calves are retained during lactation and then males are disposed off and females kept for replacement.”* (Khan, 2006, p.137)
- ☞ Commercial milk producers: these households keep more than 10 buffaloes/cows. They can produce crops besides livestock or be specialized in milk production, but a large part of the fodder is produced on-farm. Above a certain size, these producers keep a bull for mating and/or use artificial insemination facilities when these are available.

Table 24 below describes the herd composition for each household category. Figure 4 describes the proportion of households in each category by province, while Table 25 relates buffalo ownership to size of land cultivated. Finally, Table 26 illustrates the average number of buffaloes and cattle by province. The data shows that Punjab is by far the Province with more commercial livestock producers and the highest average number of livestock. While in AJK & FANA over two thirds of households are smallholder subsistence producers, in Balochistan 84 percent of households do not have any buffaloes.

Table 24 : Average number of cattle by household category (based on buffalo ownership)

buffalo ownership category	Milk buffalo	Dry buffalo	Buff heifer/calf	Milk cow	Dry cow	Cow heifer/calf	Bullock	% HHs
no buffaloes	0.0	0.0	0.0	0.4	0.2	0.4	0.1	36
subsistence smallholder	0.8	0.5	0.6	0.3	0.2	0.4	0.1	33
market oriented smallholder	2.0	1.4	2.2	0.4	0.4	0.6	0.2	26
commercial milk producer	6.1	4.9	5.8	0.9	0.8	1.1	0.2	4
Total	1.0	0.7	1.0	0.4	0.3	0.5	0.1	100

Source: Crop Benchmark & Food Security Assessment, WFP, 2008 (N=11,898)

Figure 4 : Prevalence of households (%) by buffalo ownership category (by Province)

Source: Crop Benchmark & Food Security Assessment, WFP, 2008 (N.=11,898)

Table 25 : Prevalence of buffalo ownership categories (% HHs) by cultivated land

Cultivated land (acres)	Percentage of households				Total	N
	no buffaloes	subsistence smallholder	Market oriented smallholder	commercial milk producer		
<1	56	32	10	3	100	642
1-5	42	37	19	1	100	4,940
>5-12	32	34	31	4	100	3,761
>12	26	26	38	9	100	2,555
Total	36	33	26	4	100	11,898

Source: Pakistan Crop Benchmark & Food Security Assessment, WFP, 2008

Table 26 : Average number of livestock (buffaloes and cattle) by Province

Province	Buffaloes	Cattle
AJK & FANA	1.6	0.4
Balochistan	0.4	1.1
NWFP & FATA	1.2	1.8
North Punjab	5.1	1.3
South Punjab	3.7	1.9
Sindh	2.6	0.9
Total	2.8	1.3

Source: Pakistan Crop Benchmark & Food Security Assessment, WFP 2008

4.3 Cropping patterns in the study area

According to Khan (2006), who analysed official statistics, the proportion of total cropped area devoted to food crops in Pakistan has remained virtually constant between 1950 and 2003, though over the same period it has declined by more than 10% in both NWFP and Sindh. This decline is mainly due to the increase of cash crops since the late 1960s, notably sugarcane, cotton and tobacco. The latest data (Table 27) indicates that the area devoted to food crops is about 70 percent (with 55 percent being the share of cereals) overall and up to 80 percent (70 percent for cereals alone) in NWFP, while that of cash crops is around 20 percent. Fodder contributes 11% in total

cropped area, while it is 13% for Punjab. In addition, residuals and straw from wheat, maize, rice and sugarcane are used as animal feed.

Table 27 : Share of Crop Groups in Total Cropped Area during the period 2000-03 (%)

Province	Share of crop groups							Cash crops	Fodder crops	Other	Tot
	Cereals ¹⁰	Pulses	Oil seeds	Vegetables	Fruits	Condiments	All Food				
NWFP	70	4	2	2	2	-	81	7	6	6	100
Punjab	54	7	2	1	2	-	67	19	13	1	100
Sindh	49	4	4	1	4	-	62	25	9	4	100
Tot. Pakistan	55	6	3	2	3	1	69	19	11	1	100

Source: Agricultural Statistics of Pakistan, in M.S. Khan (2006)

In irrigated areas, wheat is the main crop grown in winter (*rabi*), while during the monsoon (*khariif*) season, crop production is much more diversified. According to the CB & FSA study sample data (table 28), wheat covers 44 percent of total cultivated land, though given that most households grow two crops per year, during winter (*rabi*) this proportion is likely to be much higher.

Table 28 : Average area cultivated under different crops (acres) and cropping intensity, by province

Province	Wheat	Rice	Cotton	Sugarcane	Maize	Orchards	Others	Total	Cropping intensity
AJK & FANA	2	0	0	0	2	0	0	4	200
Balochistan	4	3	1	0	0	1	3	12	144
NWFP & FATA	3	0	0	2	2	0	1	9	147
North Punjab	7	5	0	1	0	1	0	14	148
South Punjab	6	0	5	1	0	1	1	15	153
Sindh	6	1	4	0	0	0	0	11	149
Total	5	2	2	1	1	1	1	12	148

Source: Pakistan Crop Benchmark & Food Security Assessment, WFP, 2008

Cropping intensity is the proportion of land cropped during one year out of the total land cultivated. The data on cropping intensity shows that in all Provinces land is used with relative intensity thanks to irrigation, which allows sequential cropping and intercropping, particularly with orchards. It is interesting to note that in AJK & FANA, farmers appear to fully employ their land during the two seasons despite the fact that they report virtually no irrigation (see comments under irrigation section).

Also, it is important to note that in AJK, during the monsoon (*khariif*) season, farmers share their land between rice (July-September) and maize (May-September). During the *rabi* season, both crops are followed by wheat (October-March/April). Surprisingly, there is no mention of rice in the AJK & FANA sample and there also seem to be no orchards in the Sindh sample.

Because of temperature variation depending on latitude and altitude, wheat can be sown between mid-September (upland Balochistan) and mid-December, while harvest takes place anywhere between mid-March (Southern Irrigated Plains and Central Punjab) and early June (NWFP).

4.4 Inputs' use

4.4.1 Land preparation

Land preparation is normally a crucial step to ensure the correct growth of crops. Depending on the soil type and the crop rotation followed, the type and frequency of land preparation techniques can be a strong determinant of yield.

¹⁰ Includes wheat, rice, maize, millet, sorghum and barley.

Table 29 : Percentage of households by different land preparation techniques for wheat cultivation

	Chisel	Cultivator	Disk Harrow	Rotavator	Planking	Raja Plow	Zero Tillage
% HHs	6.7	90.8	35.0	2.9	72.8	13.8	3.6
Valid N	10,368	10,368	10,368	10,368	10,368	10,368	10,368

Source: Pakistan Crop Benchmark & Food Security Assessment, WFP, 2008

4.4.2 Seed use

Seed quality, in terms of variety, certification and chemical treatment (all, in fact linked,) is reported to be a major component in the yield gap for wheat under irrigation in Pakistan. Since the CB & FSA survey did not collect data on variety and certification, frequency of seed change and source of seed were used as proxies for quality, the assumption being that more frequent change of seed and use of “company” seed imply use of improved and certified varieties. Both frequency of seed change and origin of seed were treated as non-exclusive individual questions and farmers sometimes responded positively to more than one.

Table 30 : Proportion of households (%) by frequency of change of wheat seeds, by Province

Province	Percentage of Households					N
	every year	2 years	3 years	5 years	Total	
AJK & FANA	0	21	75	4	100	100
Balochistan	38	17	40	5	100	514
NWFP & FATA	63	15	20	2	100	1,248
North Punjab	21	44	29	6	100	1,630
South Punjab	45	38	14	3	100	1,530
Sindh	57	32	11	1	100	1,412
Total	44	32	21	3	100	6,434

Source: Pakistan Crop Benchmark & Food Security Assessment, WFP, 2008

It is observed (Table 30) that overall, 44 percent of farmers change seed every year. An additional 32 percent change them every two years. This may indicate that farmers prefer, and have access to, improved varieties. However, frequency of seed change is different by Province. It is much higher in Sindh (89 percent within 2 years), South Punjab (83 percent within 2 years) and NWFP & FATA (78 percent within 2 years). In AJK & FANA three quarters of wheat farmers keep their seed for 3 years.

The above data confirmed that when looking at wheat seed sources (Table 31), respondents might not have always been able to make a difference between company and market. Overall, 60 percent of the farmers report these to be their two main seed sources. This proportion is higher in Sindh (88 percent) and in NWFP & FATA (72 percent). In Balochistan, 61 percent of farmers also report purchasing their seed from the market.

Table 31 : Proportion of households (%) by origin of wheat seeds, by Province

Province	Home	Company	Market	Total	Valid N
AJK & FANA	93	2	5	100	321
Balochistan	33	6	61	100	978
NWFP & FATA	27	10	62	100	1,441
North Punjab	72	10	18	100	2,220
South Punjab	40	29	32	100	2,055
Sindh	12	7	81	100	2,136
Total	40	13	47	100	9,151

Source: Pakistan Crop Benchmark & Food Security Assessment, WFP, 2008

4.4.3 Fertilizer application

MinFAL recommends fertilizer application for wheat should be 1 bag Di-Ammonium Phosphate (DAP) and 2 bags urea per acre. Table 32 indicates that fertilizer application, on average, is much below the recommended rates. Only Punjab province has followed the recommended dose of DAP. It should be noted that a substantial number of farmers also use Nitrogenous Phosphate (NP) fertilizer.

Table 32: Average fertilizer application rate for wheat by Province (bags per acre)

Region	DAP	NP	Urea
AJK & FANA	0.2	0.0	0.5
Balochistan	0.5	0.24	0.7
NWFP & FATA	0.9	0.13	1.5
North Punjab	1.1	0.16	0.5
South Punjab	1.2	0.04	1.4
Sindh	0.9	0.07	1.0
Total	0.9	0.11	1.0

Source: Pakistan Crop Benchmark & Food Security Assessment, WFP, 2008

Using the above table, average application rates for Nitrogen and Phosphorus were calculated, bearing in mind that the formulas for the fertilizers are: Urea (46), DAP (18:46) and NP (23:23). Thus, Table 33 confirms that in South Punjab, quantity of nitrogen applied to soils are about twice those applied in Balochistan, close to NWFP & FATA and 4 times those applied in AJK & FANA. Phosphorus application is lowest in AJK & FANA.

Table 32 A: Average fertilizer application rate for wheat by type of farmer (bags per acre)

Type of Farmer	DAP	NP	Urea
Landless	0.9	0.1	0.9
From 1/2 to 5 acres	0.9	0.1	1.0
From >5 up to 12 Acres	1.0	0.1	1.0
>12 up to 20 Acres	1.0	0.1	1.0
Total	0.9	0.1	1.0

Source: Crop Benchmark & Food Security Assessment, WFP, 2008

Table 33 : Average application rates for Nitrogen and Phosphorus (kg/acre), by province

Province	Nitrogen (kg/acre)	Phosphorus (kg/acre)
AJK & FANA	12.2	5.0
Balochistan	20.5	12.0
NWFP & FATA	43.0	21.0
North Punjab	22.0	25.0
South Punjab	43.0	28.0
Sindh	31.0	21.0
Total	31.0	21.0

Source: Crop Benchmark & Food Security Assessment, WFP, 2008

4.4.4 Weeding

It appears (Table 34) that farmers overwhelmingly use herbicides over manual weeding. Mechanical weeding is poorly practiced on wheat. Manual weeding is more common in NWFP / FATA and Sindh provinces. Small farmers use more manual weeding than others.

Table 34A : Type of technology applied for weeding of wheat by Province

Region	Manual Weeding	Weedicide Application	Mechanical Weeding
AJK & FANA	0.5	1.9	0.0
Balochistan	16.6	3.7	0.2
NWFP & FATA	19.5	54.1	0.2
North Punjab	0.6	83	6.1
South Punjab	2.3	62.4	1.1
Sindh	19.6	67.2	2.2
Total	10.5	59.4	2.3
Valid N	10526	10514	10334

Source: Pakistan Crop Benchmark & Food Security Assessment WFP, 2008

Table 34 B: Type of technology applied for weeding of wheat by type of farmer

Type of Farmer	Manual Weeding	Weedicide Application	Mechanical Weeding
Landless	8.1	58.8	1.8
From 1/2 to 5 acres	11	55.9	2.1
From >5 up to 12 Acres	11.5	62.1	2.7
>12 up to 20 Acres	10.2	62.7	2.5
Total	10.5	59.4	2.3
Valid N	10526	10514	10334

Source: Pakistan Crop Benchmark & Food Security Assessment, WFP, 2008

4.4.5 Pest and disease control

Very few farmers use pesticides or fungicides. This is despite the fact that, as will be seen later, an unusually high level of crop pests are reported, the single most important source of shock for households. Given the results of the analysis concerning access to information and production costs, it could be speculated that the reasons for such low use are both the cost of pesticides and the lack of proper advice on what to use, when and how.

Table 35 : Percentage of households applying insecticides and fungicides on wheat (%)

	insecticide	Fungicide
%	8	12
N.	6,156	2,173

Source: Pakistan CB & FSA, WFP, 2008

4.4.6 Crop production and productivity

Analysis of productivity focuses on the main food crop in Pakistan, namely wheat. Available data from the CB & FSA survey does not allow a similar analysis for other crops.

Table 36 A : Average wheat yield (kg/ha) by type of farmer

Type of Farmer	Yield munds/acre	Yield kg/Hectare
Landless	24.0	2375
From 1/2 to 5 acres	23.4	2312
From >5 up to 12 Acres	24.7	2436
>12 up to 20 Acres	25.0	2472
Total	24.2	2388

Source: CB & FSA, WFP, 2008 (N.=7,763)

Table 36 : Average wheat yield per Province (kg/ha)

Province	Yield munds/acre	Yield kg/Hectare
AJK & FANA	12.3	1213
Balochistan	16.3	1607
NWFP & FATA	22.2	2195
North Punjab	28.5	2818
South Punjab	27.3	2694
Sindh	25.7	2543
Total	24.2	2388

Source: CB & FSA, WFP, 2008 (N.=7,763)

The first step in analysing wheat yields was to convert the data collected on *munds*-per-acre¹¹ into kg-per-hectare. Table 36 & 36A shows average yields per Province and per type of farmer in the 2006-07 production year. It is apparent from the data that the highest wheat yields from the sample are found in Punjab. Average yields in NWFP & FATA and Sindh are lower than in Punjab. On the other hand, average yields in the Punjab sample are about 175% of those in Baluchistan and two-and-a-half times those in AJK & FANA.

4.4.7 Input use and the effect on wheat productivity

Existing research suggests that major components in the yield gap¹² for wheat in irrigated areas of Pakistan include variety, weed control, late planting, certified seed and seed treatment. Surprisingly, quantity of nitrogen and/or quality of fertilizer is not reported as a main determinant of the yield gap in wheat under irrigated conditions (MinFAL, 2008, p.11).

The study did not collect data on planting periods and on wheat varieties though some conclusions can be drawn on seed quality based on other data. Although the literature does not mention them as important determinants of crop productivity, their effect on yields, land preparation, fertilizer application, pest and disease control have been investigated.

It must be noted that because the survey was carried out at a time when the wheat harvest was not yet completed in most survey areas, harvest data for the 2006-07 cropping season was used.

¹¹ The *mund* is a local unit of measure equivalent to approximately 40 kg.

¹² Yield gap is "defined as the gap between yields achieved by the best farmers (top 20%) using recommended technology and modern inputs, and the average farmers" (MinFAL, 2008, p. 11)

Therefore in correlating input and technology used in 2007-08 with the 2006-07 crop yield, it was assumed that this year's yields are not significantly different from those of last year.

Regarding technology, correlation analysis (Table 37) shows a good positive association between yields and deep ploughing with a chisel plough ($r=0.45$, $p<0.01$).

With regard to inputs, a slight positive correlation has been found when planted seeds are purchased from the market and when they are changed after 3 years ($r=0.13$, $p<0.01$).

As for fertilizers, the analysis shows that actual application rates are still lower than recommended. For instance, the strong association that exists between yield and total cost of fertilizer per acre (a proxy for total quantity applied) indicates that as application rates increase, yield also increases. Given the low average application rates on wheat compared with rates recommended of 1 bag per acre, this means that there is still substantial scope for increasing yields. The fertilizer placement method may be important, with side placement showing a significant positive correlation with yield.

Table 37 : Significant correlations between wheat yield and inputs or technology applied to the crop

Indicators	Pearson Correlation	Valid N
Chisel Plough for deep Ploughing	.452**	933
Cost of Seed (Rs/Year)	-.047**	7,152
Seed change after 3 year	.133**	1,474
Seed from market	.132**	3,842
Cost of fertilizer (Rs.acre)	.336**	7,605
DAP (No. of bags per acre)	.088**	6,638
Fertilizer Application Through Side Placement	.071**	1,789
FYM Total Quantity (Munds/Acre)	.044*	2,611
Top application Urea (No of bags per acre)	.111**	3,125
Urea (No. of bags per acre)	.088**	4,767
Fungicide Application	-.108**	1,669

** . Correlation is significant at the 0.01 level (1-tailed).

Source: Pakistan Crop Benchmark & Food Security Assessment, WFP, 2008

4.4.8 Factors affecting use of inputs and crop productivity

According to the available literature, there are four important and interlinked determinants of agricultural productivity in rural Pakistan: Size of cultivated land; tenancy; irrigation; and, access to credit. All these factors affect productivity by influencing the mix of agricultural practices and inputs that farm decision makers apply. Other factors studied include the literacy level of the household decision maker as well as the education level of the farm decision maker and access by households to information on agricultural practices.

4.4.8.1 Land size

Correlation analysis shows that fertilizer application rates, estimated by the total cost of fertilizer application per acre, slightly increase when the size of the land owned and operated increase ($r=0.086$ and 0.11 respectively, $p<0.01$). Furthermore, wheat and sugarcane yields are positively affected by larger land sizes (weak correlation, with coefficient for wheat at 0.085 and for sugarcane at 0.077 , both significant at the 0.01 level). These findings do not necessarily contradict findings from previous research (see background). Indeed, the average area cultivated by a single household in the CB & FSA sample is much lower than in Pakistan generally. It is likely that increases in land size above certain limits will affect yields at a level when returns to labour and capital become more crucial and farmers do not have incentives to maximise their returns per unit of land. On the other hand, in very small farms, household labour may not be fully employed on-farm and yields should be unrealistically high to produce sufficiently big returns for the appropriate

retribution of managerial efforts. In this case, in the absence of opportunities to access more land through tenancy arrangements, it may be more interesting for farm decision-makers to diversify their sources of income.

4.4.8.2 Tenancy

Empirical evidence indicates that land owners tend to show higher productivity than tenants, probably because they get the full benefits of investing in the land. *“Lack of secure tenancy arrangements also has negative implications for productivity through disincentives on long-term investments by the tenant in land quality”* [e.g. manuring or canal lining and tube wells’ construction and maintenance]. (World Bank, RFM study, p. 22)

4.4.8.3 Irrigation

In Pakistan nearly 80 percent of the cropped area is reported to be irrigated (World Bank, RFM study, 2002). Access to irrigation offers farmers the opportunity to cultivate in the winter (*rabi*) season and to supplement rainfall during the monsoon (*kharif*) season and should therefore allow for greater productivity compared with farmers who only have access to rain fed (*barani*) areas. Therefore, reliability of water supply is the most important factor influencing yields and agricultural revenues. This depends on the ability of farmers to control the amount and frequency of irrigation water. Reliability is primarily a function of the type of irrigation. Farmers who own tube wells can better control water supply than those that only have access to canal irrigation. For canal irrigation, *“water availability decreases significantly if the watercourse is located near the tail of the distributary or minor, and/or if the plot is located near the tail end of the watercourse”* (World Bank, RFM study, 2002).

On the other hand, concerns have been raised by the salinity effects of tube well irrigation and water logging on land situated near water courses. Data from the PRHS 2001 shows that *“Seventeen percent of plots in the sample were affected by water logging and/or salinity/ sodicity”* (World Bank Pakistan Poverty Assessment 2002) with problems being particularly serious in Sindh (59 percent of all plots and 40 percent of plot area affected) and Southern Punjab (24 percent of plots and 31 percent of area). However, *“It appears that the problem of water logging may not be as serious now as it was in the past [because it could have] been reduced due to prolonged drought in the late 1990s and excessive mining of ground water”* (MinFAL, 2008, p.16).

CB & FSA study data is presented for the proportion of land irrigated under different systems during the winter (*rabi*) season (Table 38). It appears that in the survey area, water is supplied through canals in 52 percent of the irrigated land and through tube wells in 54 percent of the irrigated land (8 percent is supplied through both canals and tube wells). Ownership of tube wells is widespread in Balochistan and Punjab, while in South Punjab a substantial proportion of land is irrigated through rented tube wells. In North Punjab, up to a quarter of irrigated land is supplied both by canal and tube wells.

Table 38 : Proportion of area (%) irrigated in the rabi season, by type of irrigation, by Province

Province	Canal	own tubewell	rented tubewell	canal&tubewell	spring	total irrigated
AJK & FANA	100	0	0	0	0	100
Balochistan	25	63	6	0	6	100
NWFP & FATA	77	7	6	3	7	100
North Punjab	15	54	6	25	1	100
South Punjab	31	43	24	2	0	100
Sindh	87	5	5	3	0	100
Total	44	35	11	8	2	100

Source: Pakistan Crop Benchmark & Food Security Assessment, WFP, 2008

Table 39 : Proportion of households (%) by position on irrigation canal, by Province

Province	Head	Middle	Tail	Total	N. households
AJK & FANA	0	75	25	100	8
Balochistan	46	43	11	100	834
NWFP & FATA	29	46	25	100	1,443
North Punjab	18	51	31	100	1,196
South Punjab	19	42	39	100	2,215
Sindh	12	56	33	100	2,449
Total	21	48	31	100	8,145

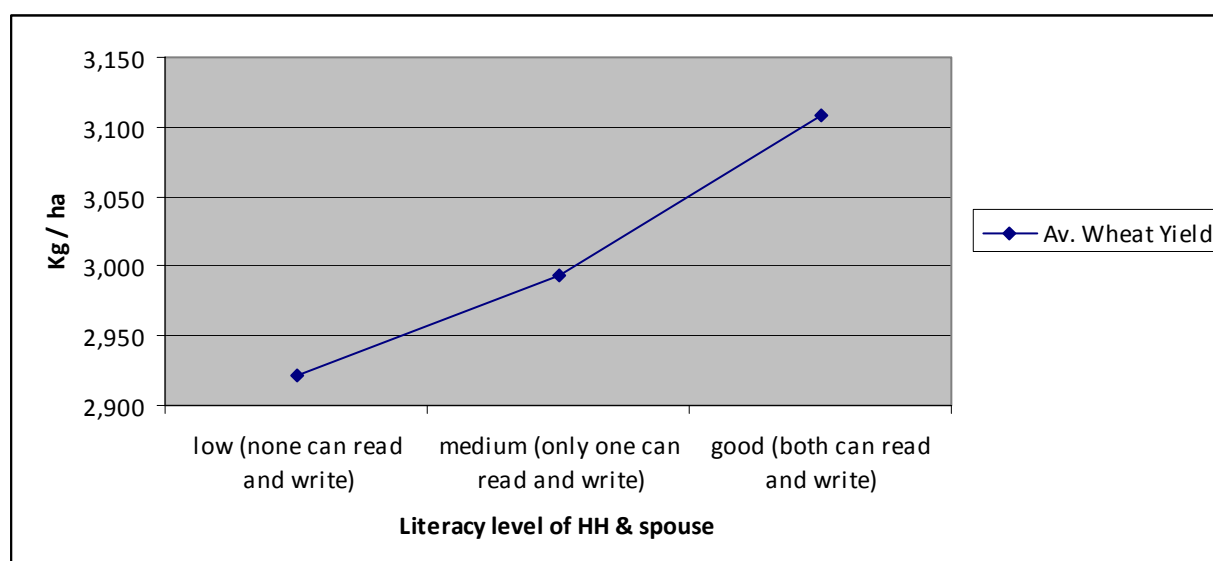
Source: Pakistan Crop Benchmark & Food Security Assessment, WFP, 2008

Concerning the area under canal irrigation, the position of the plot along the canal is crucial to determine the amount and reliability of the water supply. According to survey data, it appears (Table 39) that about a third of canal irrigated plots are positioned at the tail end of a watercourse. This is obviously a constraint to achieving higher yields.

4.4.8.4 Education

It is often assumed that higher education levels improve farm decision making that will ultimately translate into higher yields. In this case however, the data shows no clear correlation between the level of education of the farm decision maker and wheat yields. This is perhaps due to the fact that higher education levels create opportunities for off farm employment rather than directly affecting productivity.

It is interesting to report that the literacy status of both the household head and his/her spouse appears to be more important in influencing yields (Figure 5). This could be explained by the fact that the difference between being literate and illiterate plays a bigger role in improving farming decisions than differences in grades. Furthermore, literacy levels of both the head of the household and of his spouse seem to be more important for improving yields than the literacy level of the household head alone, perhaps because ultimately the wife also plays a role in farm decision making. The literacy status of the spouse is however likely to be even more important for food security, as it may affect decisions over allocation of resources within the household.

Figure 5 : Average wheat yield (kg/ha) by literacy status of household head and spouse

Source: Pakistan Crop Benchmark & Food Security Assessment, WFP, 2008

4.4.8.5 Access to credit

Credit can be used to purchase inputs, productive assets or consumables. Although it can often lead to a cycle of indebtedness and poverty, together with savings it can play a crucial role in reducing vulnerability by increasing the physical capital of the household or by smoothing income and expenditure peaks. In Pakistan, “*Non availability of adequate credit has been one of the major impediments in the development and growth of the [agriculture] sector.*” (MinFAL, 2008, p. 24) Uneven geographical distribution of financial institutions, capacity constraints and lack of financing products that match the needs of farmers appear to be the main constraints to an adequate supply of agricultural credit. On the demand side, “*The most common collateral available to farmers is the passbook issued by the provincial revenue authorities. Non availability of passbooks, issues of fake passbook and non-cooperation of revenue authorities with the banks and borrowers are the major bottlenecks. Such issues are serious particularly in Sindh and Baluchistan.*” (MinFAL, 2008, p. 26) Also, high cost and substandard quality of inputs and low farm gate prices make “*borrowers unviable for credit.*” (MinFAL, 2008, p. 26)

“*In rural Pakistan [...], poor households are often credit-constrained. In formal markets, access to credit is generally limited to landowners, since land is the main form of acceptable collateral for loans. Access to credit in informal markets, particularly supplier’s and consumer’s credit is more widespread, yet approximately 40 percent of rural households are credit constrained.*” (World Bank, RFM study, p. 46). In the past various forms of subsidisation have taken place, particularly to help farmers purchase tractors. With concern to credit, past data is not necessarily a good guide because conditions in the sector can change quickly. “*According to PRHS 2001-02 data, nearly 80 percent of cultivator households participate in the credit market.*” (World Bank, RFM study, p. 46)

According to the same source, however, only 11 percent accessed formal loans (and 14 percent of land owners against only 2 percent of non land owners), 75 percent obtained informal sector loans (including 72 percent of land owners and 84 percent of non land owners). Informal sector loans are usually smaller in size (approximately a quarter on average), of shorter duration (about one fifth), are mostly cash, and seldom require collateral as compared to formal sector loans.

Regarding the implications of credit constraints, “*Econometric analysis of plot-level data suggests that lack of access to credit significantly reduces farm productivity (measured as gross value of output per unit of land). Controlling for various plot-level characteristics including plot size, land value, topography, irrigation and soil type, as well as crop mix, the value of yields of the 41 percent*

of households who faced credit rationing in the formal sector was 9 percent lower than the value of yields of non-credit rationed households. Households who faced credit rationing in both the formal and informal sectors (approximately 17 percent of all households) had a 23 percent reduction in value of yields. This reduction in farm productivity for credit-constrained farmers is likely due to lower input use (seed, fertilizer and tractor rentals), as well as fewer long-term investments in land or equipment. In addition to this effect on yields, lack of access to credit may prevent some farmers from cultivating more land (through rental markets). The net effect on area cultivated is zero, however, unless the land rented in would otherwise be fallow.” (World Bank, RFM study, p. 54)

During the present study, respondents were asked to report whether they obtained any type of credit during past 2 years.

Table 40 : Percentage of households (%) that obtained credit in past 2 years, by Province

Province	Households that obtained credit	
	(%)	Valid N.
AJK & FANA	4	189
Balochistan	32	1,536
NWFP & FATA	38	1,606
North Punjab	32	2,274
South Punjab	26	2,325
Sindh	63	2,396
Total	38	10,326

Source: Crop Benchmark & Food Security Assessment, WFP, 2008

revealed no influence of factors such as land ownership or wealth levels on access to credit. Indeed, there seem to be wider geographical differences in access when disaggregating data at District level (see table 41). This suggests that availability of financial services in the different areas is the main determining factor allowing households to obtain credit.

Table 41 : Percentage of households (%) that obtained credit in past 2 years, by District

District	Households that obtained credit	
	(%)	Valid N
Bannu	26	336
Charsadda	54	302
D. I. Khan	27	370
Gilgit	0	4
Gujranwala	35	729
Jaffarabad	13	359
Khairpur	45	450
Khuzadar	71	312
Khyber Agency	8	12
Killa Saifullah	16	297
Kotli	4	56
Larkana	66	296
Lasbellla	29	303
Mirpur Khas	52	403
Muzaffargarh	13	792
Naushero Feroz	77	420
Nawab Shah	69	392
Peshawar	65	262

Figure 40 shows differences by province. While only 4 percent of households in AJK & FANA declared having obtained credit in the past two years, in Sindh this proportion increases to nearly two thirds of all households. In the remaining Provinces, about one third of households have obtained credit in the past two years.

The above data could be an indicator of both the availability of financial services, and household access to those services, which could be influenced by land ownership or by wealth status. Further analysis of survey data has

District	(%)	Valid N
Pishin	35	265
Poonch	4	129
R.Y. Khan	34	842
Sahiwal	33	692
Sanghar	69	435
Sargodha	27	790
Sialkot	36	755
Swabi	28	324
Total	38	10,327

Source: Crop Benchmark & Food Security Assessment, WFP, 2008

This analysis cannot be completed without examining what are the main sources of credit for households. According to Table 42 below, only 37 percent of households had access to institutional sources of credit, the highest proportion being in Punjab (close to 70 percent overall) and lowest in Sindh (14 percent) and NWFP & FATA (18 percent). Cooperatives represent the most important institutional source of credit in North Punjab (39 percent), while commercial banks that appear to be the financial institution most

farmers rely on in South Punjab (47 percent) and NWFP & FATA (16 percent). In Balochistan, over one third of households receive credit from other institutional sources, which are likely to be Non Governmental Organisations (NGOs) providing credit in the framework of development programmes.

Nearly two thirds of all households in the sample reported obtaining credit from informal sources. Among these, the most important are friends and relatives in NWFP & FATA (58 percent) and *arthies/ beoperies* in Sindh (60 percent) and Balochistan (35 percent). The latter are wholesalers stationed in markets who normally provide credit to farmers for the purchase of inputs, and who then will assist those same farmers to auction their produce in the market. The *arthie* will then deduct the value of the loan plus a commission from the product of the sale and give the balance to the farmer. Finally, input dealers are an important source of credit in Sindh (21 percent) and in South Punjab (12 percent).

Table 42 : Distribution of households (%) by source of credit, by Province

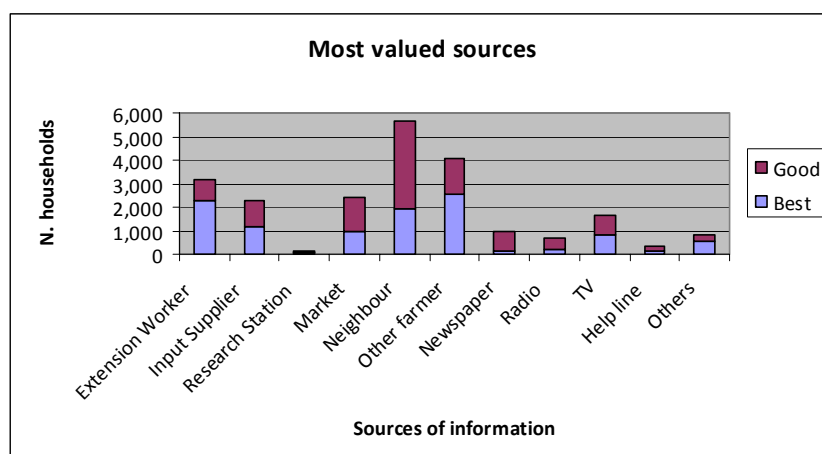
Province	Households (%) by source of credit							Grand Total	Valid N.
	Institutional credit sources			Non institutional credit sources					
	Cooperatives	Commercial banks	Other	Friends / relatives	Arthies / beop	Mills	Input dealers		
AJK & FANA	0	0	0	100	0	0	0	100	5
Balochistan	1	3	38	18	35	0	5	100	757
NWFP & FATA	1	16	1	58	22	0	1	100	611
North Punjab	39	22	5	12	19	0	3	100	732
South Punjab	8	47	14	9	7	1	12	100	630
Sindh	3	9	3	4	60	0	21	100	1,529
Total	9	17	11	16	35	0	11	100	4,264

Source: Pakistan Crop Benchmark & Food Security Assessment, WFP, 2008

Important as access to credit may be to facilitate farmers' access to inputs at planting stage, analysis of the sample data does not show any significant correlation between access to credit and wheat yield. This could be due to the fact that access to credit refers to the past two years, therefore it may not reflect access in the 2007-08 production season. It could perhaps also be explained by the fact that only part of the credit goes into purchasing inputs, or that credit is mostly obtained for cash crops.

4.4.8.6 Access to information

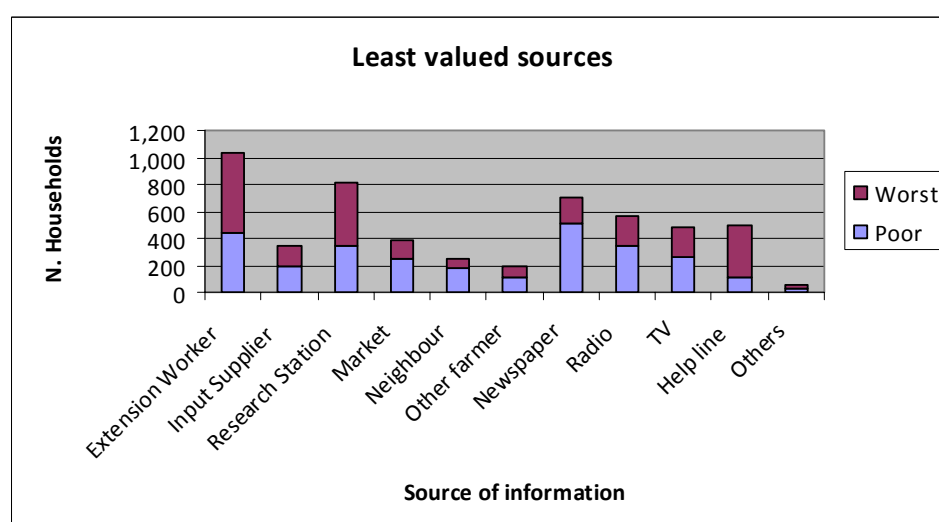
Access to information by farmers was assessed extensively in the survey. In particular, respondents were asked to list the three most important sources of information for farming and to give them a value on a one (best) to five (worst) scale. Analysis was done for the 'most valued' (good and best) and 'least valued' (bad and worst) sources.

Figure 6 : 'Good' and 'best' sources of information for farming (N. households)¹³

Farmers seem to highly value the opinions of neighbours as well as that of other farmers in the village. Nevertheless, over a sixth of households reported that extension workers are the best source of information. Extension workers are also by far perceived as the worst source of information, though on balance an equal number of farmers have a positive view of extension workers (Figures 6 and 7).

Source: Pakistan Crop Benchmark & Food Security Assessment WFP, 2008

Radio and television do not seem to be important sources of information for farming. Given that up to 60 percent of households in the sample own a TV set (presumably more own a radio, though this was not investigated in the survey), it could be argued that this could be an appropriate medium to spread extension messages, perhaps in an entertaining form.

Figure 7 : Frequency of reported 'bad' and 'worst' sources of information for farming (N. households)

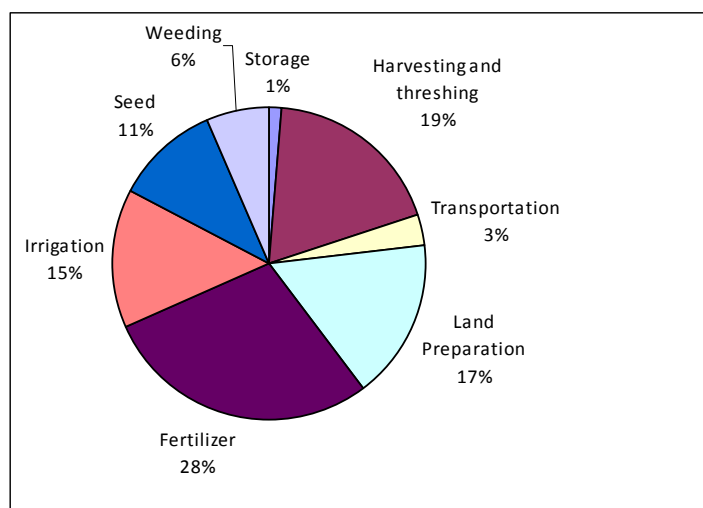
Source: Pakistan Crop Benchmark & Food Security Assessment WFP, 2008

4.4.9 Production costs and returns on land from wheat production

Total average wheat production costs in the 2006-07 season were estimated at about 8,600 Rs/acre. Average costs do not vary significantly according to size of land. The major sources of cost for the farmer appear to be fertilizer (28 percent) and harvesting and threshing (19 percent) because these are very labour intensive, and land preparation (17 percent), implying tractor rental and implements. Irrigation (15 percent) and seeds (11 percent) are also important costs for farmers. Weeding costs, at about 6 percent of the total, are due to the high price of herbicides (Figure 8).

¹³ Absolute numbers are presented instead of percentages because there is not same number of valid responses for all variables

Figure 8 : Share of production costs (%) by cost type



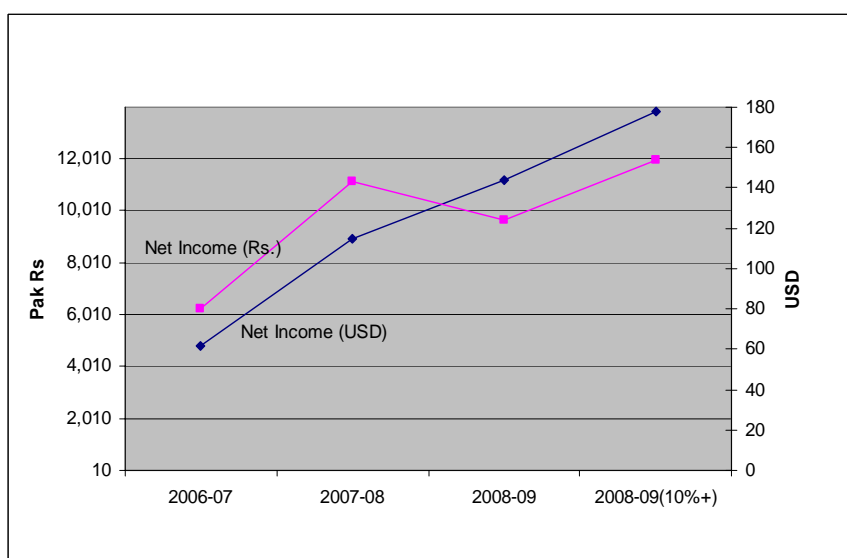
Using survey data, the average net income per acre for wheat production for production years 2006-07, 2007-08 and 2009-09 was calculated. To achieve this, a number of assumptions were made.

On the revenue side, it was assumed that wheat yields in 2007-08 and 2008-09 would equal average figures for 2006-07 production season. Average yields in *munds* were then multiplied by the government support price of 480 Rs/*mund* (12 Rs/kg) in 2007, 640 Rs/*mund* (16 Rs/kg) in 2008 and 940 Rs/*mund* (23.5 Rs/kg) in 2009.

Source: Pakistan Crop Benchmark & Food Security Assessment WFP, 2008

Concerning costs, figures for the 2006-07 production season were also used as a basis. For subsequent years, fertilizer application rates were kept unchanged but actual fertilizer prices were used and other costs were increased by 19 percent between 2006-07 and 2007-08 and by 50 percent between 2007-08 and 2008-09. An additional projection was made for an increase in average yields of wheat by 10 percent.

Figure 9 : Net income from wheat production in Pakistani Rupees (Rs/acre) and US dollars (USD/acre), 2007-2009



Source: Pakistan Crop Benchmark & Food Security Assessment WFP, 2008

Results of this analysis are illustrated in Figure 9. In nominal terms, net income has increased by 86 percent between 2007 and 2008 and is expected to increase a further 25 percent in 2009 at current production levels. Given the current trend in exchange rates with the US dollar and with the current wheat support price of the Government, in dollar terms the average net income is expected to decrease by 13 percent unless average yields are raised (see fig. 10).

5 Access to Food

Households consume different foods, not all of which can be directly produced. Access to food is determined both by own production and by the capability to purchase food. Analysis will be concentrated on wheat, which is the main food crop in the country.

5.1 Wheat production

Household food production is affected by the size of land available for farming (either owned or rented), the proportion of land that is dedicated to food crops and land productivity.

Table 43 : Proportion of cultivated land under wheat (%) and food crops (%) and average area (acres) cultivated under wheat, rice and maize, by Province

Province	% of land cultivated with wheat	% of land cultivated with food	Average area cultivated (acres)			
			Wheat	Rice	Maize	Total
AJK & FANA	43	100	2	0	2	4
Balochistan	33	57	4	3	0	12
NWFP & FATA	39	60	3	0	2	9
North Punjab	49	88	7	5	0	14
South Punjab	42	48	6	0	0	15
Sindh	52	60	6	1	0	11
Total	44	64	5	2	1	12

Source: Pakistan Crop Benchmark & Food Security Assessment WFP, 2008

Table 43 shows that in AJK & FANA virtually all land is under food crops. The maize crop is also used for fodder, however. North Punjab's share of land under food crops is very high (88 percent) while Balochistan devotes less than 50 percent of its land to food production.

5.2 Income sources and Livelihood Profiles

Rural households can derive income from the sale of crops or livestock, from permanent or part-time employment in the agriculture or non-farm sectors and from remittances.

Access to financial services (savings and credit), whether from formal or informal sources, may be important because it allows households to smooth fluctuations in incomes and avail resources when they may be needed to avert a food crisis. With regard to this issue the literature for Pakistan is scant and focuses on credit to purchase inputs or machinery for agricultural production (see section on access to credit). Among the factors that affect employment and incomes, education is probably one of the most important. Extensive information exists on this topic in the poverty literature (see section on education).

The analysis of the CB & FSA survey data has first focused on identifying what are the main sources of income for the sample households and then looks at on farm and off farm income and their determinants. Finally, data on main livelihood sources is been used to construct livelihood profiles.

5.2.1 Priority income sources

The present study sought to identify the four priority sources of income for sample households. Since very few households reported four sources, analysis was undertaken only on the first three sources of income (Table 44).

Overall, 40 percent of the sample declared to have only one income source, 45 percent reported two income sources and 14 percent three income sources. Sale of own agricultural production is overwhelmingly the main source of income for most households, perhaps not surprisingly since the survey specifically focuses on small and medium farming households. Overall, 80 percent of households reported the sale of crops as their first source of income and a further 10 percent reported it as their second.

Salaries (the first source for 5 percent of households, second source for 13 percent and third source for 3 percent) and sale of livestock (first source for 2 percent of households, second source for 17 percent and third source for 4 percent) comes a distant second.

Table 44 : First, second and third income sources (% of households)

Income source	First	Second	Third
Production and Sale of Agriculture Crops	84	18	15
Salaries, Wages(Employees, Longer-Term)	5	23	23
Livestock Rearing and/or Selling	2	30	27
Others	2	4	7
Unskilled wage labor agriculture	2	3	2
Skilled wage labor	1	5	5
Unskilled wage labour non-agriculture	1	5	4
Seller Commercial activity	1	4	6
Remittances	1	3	3
Petty Trading	0	2	4
Collection of aquatic animal	0	1	2
Business	0	1	1
Collecting Allowance (Pension, Disability Benefit)	0	1	1
Brewing	0	0	1
Total	100	100	100
N	11,612	6,924	1,655

Source: Pakistan Crop Benchmark & Food Security Assessment WFP, 2008

5.2.2 Crop marketing

According to a study on the socio-economic and livelihood impact of high food prices in Pakistan, *“it is estimated that only one third of the domestic production [of wheat] goes into the markets [...] with the remaining two thirds consumed on farms”* (UN IAAM, 2008, p. 10)

According to the present data, however (Table 45), home consumption represents only 39 percent of total production and, if wheat used for planting or as an animal feed is taken into consideration, up to 43 percent remains in the homestead. On the other hand, the proportion of wheat that goes into the market represents less than half of total production. A further 10 percent goes to remunerate the land owner or to pay artisans. These aggregate figures hide huge provincial differences. In AJK & FANA, 95 percent of wheat produced is consumed at home. In Balochistan, households consume nearly 40 percent of the produce and put roughly the same proportion on the market. In NWFP & FATA, very little (14 percent) is marketed, while nearly two thirds (61 percent) is consumed at home. In Punjab and Sindh roughly only one third of the wheat produced is consumed at home.

In Balochistan, NWFP & FATA and Sindh around 20 percent of the wheat produced goes to remunerate the landlord. The high proportion of wheat sold on the market in Punjab and Sindh is

Table 45 : Destination of total wheat production(%), by Province

Province	Land owner	Home consumption	Seeds & feed	Artisans	Market	Total
AJK & FANA	1	95	2	1	1	100
Balochistan	19	38	2	2	39	100
NWFP & FATA	22	61	1	2	14	100
North Punjab	1	27	4	5	64	100
South Punjab	3	32	9	2	54	100
Sindh	19	37	1	0	43	100
Total	7	39	4	3	47	100

Source: Pakistan Crop Benchmark & Food Security Assessment WFP, 2008 (N.= 5,432)

explained by the fact that in those Provinces food is purchased by provincial Food Departments and the para-statal Pakistan Agricultural Storage and Supplies Corporation (PASSCO).

With regard to the destination of marketed production, the study on the impact of high food prices in Pakistan reports that “*The role of the private sector, primarily wheat traders and flour millers, is limited. Traders and millers may buy from farmers, but only after the procurement target is achieved; usually after June. Millers buy from the market to supplement quotas given by the government and ensure operations run. [...] The private sector purchases [...] less than 10 percent of wheat produced, or one fourth of marketable surplus. Traders do not have adequate storage facilities (less than 1 million mt) and usually supply the market from May to August, after the harvest. From September onwards the government releases wheat to the flour mills.*” (UN IAAM, 2008, p. 10)

Table 46 : Proportion of households (%) by destination of marketed wheat, by Province

Province	within village	trader	town market	govt agency	private processor	Total
AJK & FANA	14	57	29	0	0	100
Balochistan	6	8	86	0	0	100
NWFP & FATA	22	22	55	2	0	100
North Punjab	18	51	15	1	15	100
South Punjab	78	8	9	2	2	100
Sindh	1	46	44	0	9	100
Total	37	32	21	2	8	100

Source: Pakistan Crop Benchmark & Food Security Assessment WFP, 2008

town markets. Finally, in AJK & FANA, North Punjab and Sindh, about half of interviewed households report selling wheat to traders.

Data from the present study (Table 46) shows that a negligible proportion of households report selling to a government agency, however, including in Punjab and Sindh. In South Punjab, 78 percent of farmers sell wheat within their village, while in Balochistan, where villages are small and far apart, 86 percent of households sell in

5.2.3 Income from Livestock

“In spite of considerable integration into the market economy, the small size herds of ruminants and poultry provide a small proportion of output for sale. It is estimated that only 30-40 percent of milk ever enters the market. (Khan, 2006, p.133)

Table 47 : Average daily income from sale of milk by household category based on buffalo ownership (Rs)

Categories based on buffalo production	Daily income
subsistence smallholder	38
market oriented smallholder	151
commercial milk producer	711

Source: CB & FSA WFP, 2008

Buffaloes are mainly kept for milk production. Four categories of households were defined based on buffalo ownership, namely those with ‘no buffaloes’, ‘subsistence smallholders’ who keep from one two three buffaloes, ‘market oriented smallholders’ who keep four to ten buffaloes and ‘Commercial milk producers’ who keep more than 10 buffaloes. Table 47 shows that daily income from market oriented small producers is nearly 4 times higher than for subsistence producers. Commercial producers are in a totally different category and derive on average 20,000 Rs per month from the sale of milk and milk products.

Besides cattle, farmers in Pakistan can derive an income from small ruminants and poultry. Concerning the latter, the study has distinguished between household production, whereby birds are normally managed by women, left to scavenge for food and confined to the house at night, and commercial production.

Table 48 : Number of households that have poultry for family consumption (in the backyard) and poultry on commercial scale and average number of birds in each category, by Province

province	backyard		Commercial	
	N. households	Av. N. chicken	N. households	Av. N. chicken
AJK & FANA	80	9	0	.
Balochistan	275	7	0	.
NWFP & FATA	573	9	0	.
North Punjab	212	8	6	3,967
South Punjab	468	7	1	2,000
Sindh	649	6	0	.
Total	2,257	7	7	3,686

Source: Pakistan Crop Benchmark & Food Security Assessment WFP, 2008

Buffaloes are mainly kept for milk production. Four categories of households were defined based on buffalo ownership, namely those with ‘no buffaloes’, ‘subsistence smallholders’ who keep from one two three buffaloes, ‘market oriented smallholders’ who keep four to ten buffaloes and ‘Commercial milk producers’ who keep more than 10

It is obvious from the data (Table 48) that commercial poultry production is on a totally different scale to backyard production. Households that declare having chicken in their backyard have 7 birds on average, the lowest number (6 birds) being found in Sindh, the highest (9 birds) in AJK & FANA. On the other hand, few households produce chicken on a commercial scale, most of them in North Punjab, with an average of nearly 4,000 birds. This implies high investment and correspondingly high risk.

5.2.4 Employment and Off-Farm Income

The present survey investigated employment of family members above 15 years. Employment categories included:

- ☞ Full time, On-Farm Labour: Employed permanently as unskilled labourers on agricultural farms;
- ☞ Full time, On-Farm Skilled Labour: Employed permanently as skilled labourers on agricultural farms;
- ☞ Full time, On-Farm Regular Job: Farmers who are self employed on their farm;
- ☞ Full time, On-Farm Business: Farmers who have a commercial agricultural enterprise (e.g. intensive poultry production);
- ☞ Full time, Off-Farm Labour: Permanent unskilled work in the non-agriculture sector (e.g. construction),
- ☞ Full time, Off-Farm Skilled Labour: Permanent skilled work in the non-agriculture sector (e.g. construction),
- ☞ Full time, Off-Farm Regular Job: e.g. Transport
- ☞ Full time, Off-Farm Business: e.g. Shop keeper, other businessmen, etc.
- ☞ Part time, On-Farm Labour
- ☞ Part time, On-Farm Skilled Labour
- ☞ Part time, On-Farm Regular Job: People work two hours a day or one day per week on a regular basis.

Table 49 : Percentage of household members (%) by type of employment and percentage of members employed out of total estimated household labour force (15 to 64 years), by Province

Province	On Farm (%)		Off Farm (%)	Total Employed (%)	% HH members employed (of total labour force)
	Full Time	Part Time	Full Time		
AJK & FANA	34	14	52	100	50
Balochistan	62	9	30	100	43
NWFP & FATA	62	10	28	100	47
North Punjab	70	2	28	100	37
South Punjab	92	4	5	100	40
Sindh	28	8	64	100	24
Total	65	7	28	100	39

Source: Pakistan Crop Benchmark & Food Security Assessment WFP, 2008

employed full time on the farm. There were substantial differences between Provinces, however. Sixty-four percent of employed members in Sindh and 52 percent in AJK&FANA were employed full time off farm against only 5 percent in Punjab.

☞ Part time, On-Farm Business

No Part time Off-Farm jobs were recorded. Households for which employment of family members data were recorded numbered 10,412.

The data shows that just over one third of all working age family members declared being employed (Table 49). Of those that declared being employed, about two thirds overall were

Amongst those household members employed full time on the farm (Table 50), 93 percent work as unskilled daily labourers. Only in Sindh, a quarter of household members of working age considered themselves to be either fully employed in their farm or that they manage farming as a business.

Amongst those members with full time employment off farm (Table 51), 44 percent had a regular job, while another 40 percent were employed as skilled/ non skilled labourers.

Finally, of those members with part time employment on farm (Table 52), more than 60 percent work as unskilled labourers.

Table 51 : Percentage of household members by type of Off Farm Full Time job, by Province (%)

Province	Percentage of HH members on Off Farm Full Time job (%)			
	Business	Labour	Regular Job	Skilled labour
AJK & FANA	22	24	30	24
Balochistan	14	34	34	18
North Punjab	17	11	50	22
NWFP & FATA	11	24	49	16
Sindh	20	21	45	14
South Punjab	24	13	48	16
Total	16	22	44	18

Source: Pakistan Crop Benchmark & Food Security Assessment WFP, 2008

Table 50 : Percentage of household members (%) by type of On Farm Full Employment, by Province

Province	Percentage of HH members on on-Farm Full Time job (%)				
	Business	Labour	Regular Job	Skilled labour	Total on Farm
AJK & FANA	1	99	0	0	100
Balochistan	1	92	4	3	100
NWFP & FATA	1	97	2	0	100
North Punjab	1	94	3	1	100
South Punjab	1	92	3	4	100
Sindh	10	68	14	8	100
Total	2	93	3	2	100

Source: Pakistan Crop Benchmark & Food Security Assessment WFP, 2008

Table 52 : Percentage of household members by type of On Farm Part Time Employment, by Province (%)

Province	Percentage of HH members on On-Farm Part Time job				
	Business	Labour	Regular Job	Skilled labour	Total on Farm
AJK & FANA	27	42	18	14	100
Balochistan	1	90	3	6	100
North Punjab	11	60	19	10	100
NWFP & FATA	7	51	31	11	100
Sindh	22	47	8	23	100
South Punjab	4	86	5	5	100
Total	10	61	17	11	100

Source: Pakistan Crop Benchmark & Food Security Assessment, WFP, 2008

5.2.5 Livelihood Profiles

Information on the three main income activities and their contribution to the household total income has been used to identify groups of households that share similar livelihood profiles. Analysis (see the methodological note in Annex 4) has identified 11 clusters described in the table below. For each cluster, the table shows the number of households and the proportion they represent of the total sample, and the contribution of each activity (in percent) to the total income.

Table 53 : 11 livelihood profiles

Class	%	crop production	Livestock	commercial (business, selling)	hunting, gathering, fishing	remittance & allowance	brewing & artisans	petty trade	salaries	skilled wage	unskilled wage (agric)	unskilled wage (non agric)	other
1	41.2	97%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	2%
2	19.2	61%	35%	0%	0%	0%	0%	0%	2%	0%	0%	0%	1%
3	19.7	54%	2%	0%	0%	0%	0%	3%	39%	0%	0%	0%	0%
4	1.9	16%	3%	0%	0%	0%	0%	0%	0%	1%	78%	1%	0%
5	4.3	50%	1%	1%	0%	0%	0%	0%	2%	44%	0%	1%	0%
6	3.6	51%	2%	45%	0%	0%	0%	0%	2%	0%	0%	0%	0%
7	0.7	46%	4%	0%	43%	0%	0%	0%	2%	2%	2%	0%	0%
8	3.8	57%	2%	0%	0%	0%	0%	0%	2%	0%	0%	39%	0%
9	0.2	45%	1%	0%	1%	0%	47%	0%	2%	0%	2%	0%	1%
10	3.6	47%	1%	1%	0%	44%	0%	1%	4%	1%	0%	0%	1%
11	2	10%	2%	0%	0%	0%	0%	0%	1%	0%	0%	0%	87%
total	100	71%	7%	2%	0%	2%	0%	1%	8%	2%	2%	2%	3%

Source: Pakistan Crop Benchmark & Food Security Assessment WFP, 2008

One group dominates, representing over 40 percent of sample households, which derives all of its income from crop sales. There are a further five groups, with a combined 50 percent of sample households that have more diversified sources of income but who derive on average at least half of their income from crop sales.

Table 54 : Distribution of households by livelihood group and province (% of households)

Provinces	Crop	crop/lstock	crop/salary	unskill/crop	crop/skill	crop/comm	crop/hunt	crop/unskill	crop/artisan	crop/remitt	other	total
AJK & FANA	18	0	27	2	12	8	1	3	0	26	3	100
Balochistan	49	1	19	5	5	4	0	11	0	1	3	100
NWFP & FATA	45	1	29	2	6	4	0	6	0	6	1	100
North Punjab	47	14	22	0	4	3	0	1	0	5	3	100
South Punjab	41	42	9	1	1	2	0	1	0	0	2	100
Sindh	32	30	19	2	4	5	2	3	0	0	2	100
Total	41	19	20	2	4	4	1	4	0	4	2	100

Source: Pakistan Crop Benchmark & Food Security Assessment WFP, 2008

With regard to distribution by province, the crop and livestock group is well represented in Punjab (mostly South Punjab) and in Sindh. The crop and salaries group represents roughly between 20 and 30 percent in all Provinces except in South Punjab (9 percent). The crop and remittances group represents a quarter of the cases in AJK & FANA. The crop & unskilled labour group is more important in Balochistan where it represents over 10 percent of the sample.

5.3 Household Expenditures and Food Consumption

5.3.1 Food Expenditures

The recent study on food prices found that increases in food prices have reversed the trend of a declining share of food in total household expenditure. Analysis of 2005-06 HIES data shows that on average, “*In rural households food accounts for 41 percent expenditure [...]*” (UN et al., 2008, p. 26), for an average monthly per capita value of Rs.1,200. The 2008 survey, though not representative of Pakistan, found “*all households spend now more on food than a year ago, while non food expenditure rose as well but at a lower pace [...]. In relative terms, the increase is more pronounced in rural areas, where food expenditure rose by 10 percent and total expenditure by 4 percent [...]*” (UN et al., 2008, p. 26). Current shares of food in total household expenditures were reported to vary between 32 percent in Punjab and 47 percent in Baluchistan.

Households spend less than 4 percent of total expenditures on education, translating into 6-7 percent of their non food expenses. The share in urban areas is higher and it increases as the level of wealth increases. In addition to these direct costs, households bear the opportunity costs of schooling, such as income earned by children and support with household duties and farm work. The substantial increase in transport costs will also make the choice whether to continue schooling or not even harder for poor households who live far away from schools. Observations from the field confirm that households cope with the price crisis by removing children from school, sending children to

Table 55 : Share of food expenditures (%) out of total expenditures and per capita food expenditures (Rs per month), by Province

Province	Average % of food expenditures	Average per capita food expenditures (monthly)
AJK & FANA	73.8	1,293
Balochistan	70.2	781
NWFP & FATA	61.7	811
South Punjab	55.9	878
North Punjab	54.5	1,208
Sindh	57.3	836
Total	59.6	932

Source: Pakistan Crop Benchmark & Food Security Assessment WFP, 2008

work and moving them from private to public schools (UN et al., 2008, p. 32-33).

In regard to food consumption, the price study states that, “*On average a Pakistani consumes 2,372 kcal daily (HIES 2005/06). The diet is dominated by cereals, and particularly by wheat. Wheat accounts for 45 percent of the kcal intake, while protein consumption is less than 9 percent of kcal intake, which is below internationally recommended levels (10-12 percent).*” (UN et al., 2008, p. 28) The rural population is reported to consume less calories (2,397 kcal) on average than the urban population but to have a more diverse diet.

5.3.2 Food Consumption Groups

While “*there is no single way to measure food security, the concept itself being rather elusive*” WFP has developed “*a standard food consumption data collection instrument and analysis approach that is flexible enough to have equally applicable analysis techniques and equally interpretable results, and also one that can be implemented in the field in a reasonable data collection and analysis timeframe. [...] The Food Consumption Score (FCS) is a composite score based on dietary diversity, food frequency, and relative nutritional importance of different food groups*”¹⁴ consumed in the household during one week before the survey (for methodological details, see Annex 2 or consult the WFP Technical Guidance Sheet. The FCS is used as a proxy to describe ‘current’ food security at household level.

¹⁴ WFP, Food Consumption Analysis, Technical Guidance Sheet, VAM Unit, p. 4-5

For the computation of FCS, food items are grouped into eight food groups: 1) cereals and tubers, 2) pulses, 3) vegetables, 4) fruits, 5) meat, fish and eggs, 6) milk, 7) oil and fats, 8) sugar¹⁵. Using appropriate thresholds, the FCS is then transformed into a categorical variable composed of three categories (poor, borderline, acceptable food consumption). Typical thresholds (21 and 35) need to be validated during each food security assessment to guarantee that they are in harmony with country-specific food consumption patterns¹⁶.

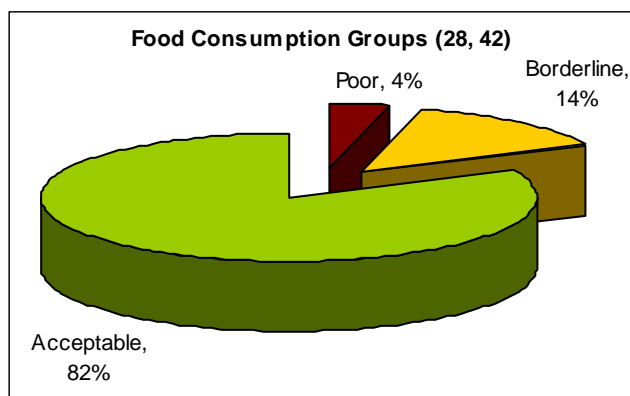
In the present study the FCS is calculated using the standard methodology and cut-off points appropriate for Pakistan have been identified (see Annex 2 for details). Surveyed households have been reclassified into three Food Consumption Groups: 'poor' (0-28), 'borderline' (28.5-42) and 'acceptable' (>42) (Table 56).

Table 56 : Pakistan CB & FSA 2008 – FCS Cut-off points

Cut-off points	Profiles
0-28	Poor food consumption
28.5-42	Borderline food consumption
>42	Acceptable food consumption

Source: Pakistan Crop Benchmark & Food Security Assessment WFP, 2008

Figure 12 : Pakistan CB & FSA 2008 – Prevalence of Food Consumption Groups



Results from the analysis show that 4 percent of households have poor food consumption, nearly 14 percent have borderline food consumption, and the remaining 82 percent of households have acceptable food consumption (Figure 12).

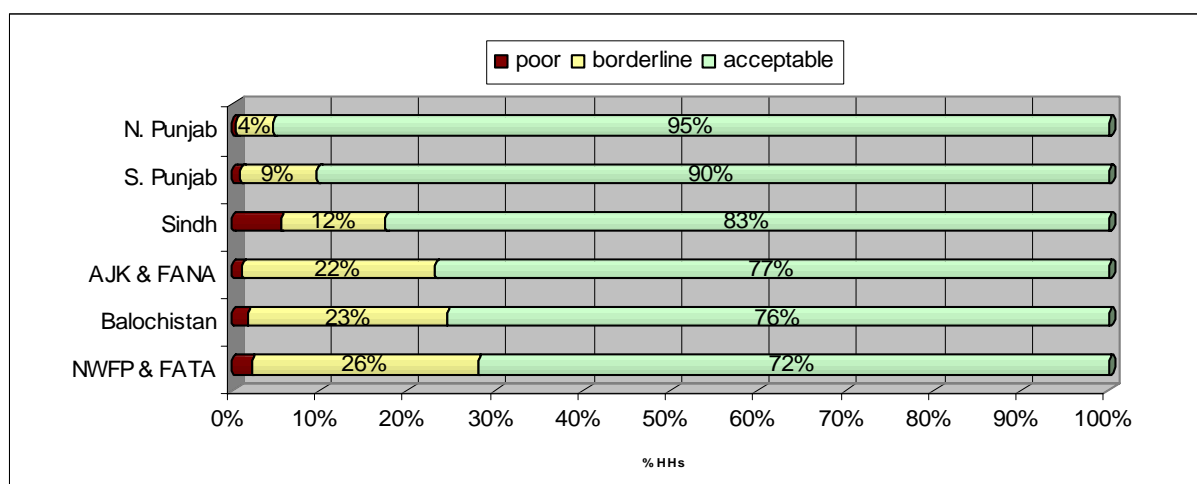
There are remarkable differences in the distribution of the food consumption groups by province. Punjab shows the highest levels of acceptable consumption (90 percent of households have acceptable consumption in South Punjab, 95 percent in North Punjab). In

AJK & FANA, Balochistan and NWFP & FATA between a fifth and a quarter of the households have 'borderline' consumption (Figure 13).

Prevalence of acceptable consumption in North and South Punjab is significantly ($p < 0.05$) higher compared with all the other provinces. Acceptable consumption in Sindh is significantly ($p < 0.05$) higher (83%) compared with AJK & FANA, Balochistan, and NWFP & FATA.

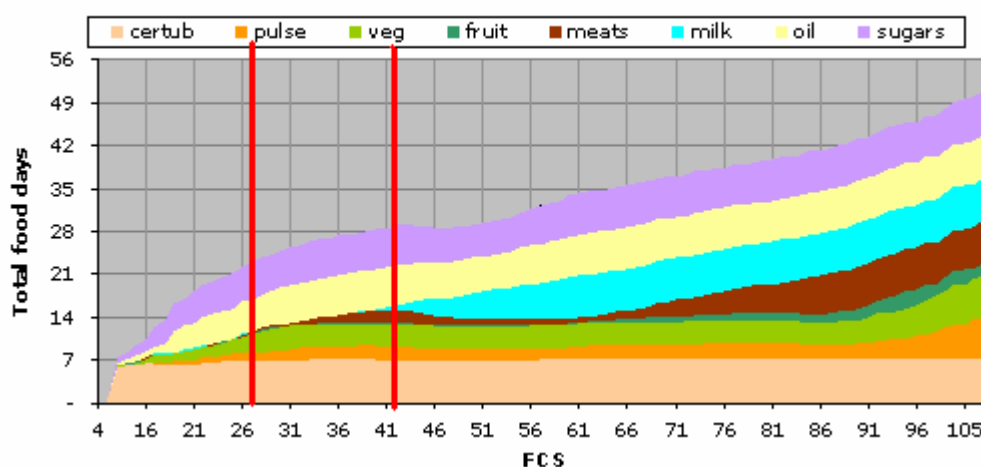
¹⁵ Consumption of condiments is collected through the food consumption module, but condiments do not contribute to the FCS.

¹⁶ In particular, pervasive and high consumption of oil and sugar 'artificially' increase the FCS. In countries with high consumption of oil and sugar (like Pakistan), it is recommended to increase the standard thresholds. Further methodological details are reported in Annex X.

Figure 13 :Distribution of Food Consumption Groups by Province


Source: Pakistan Crop Benchmark & Food Security Assessment WFP, 2008

During the analysis, consumption of specific food items/ groups was analysed. In particular, the distribution of eight main food items/ groups across the FCS values were explored in order to capture the food consumption patterns of the three groups and identify differences between provinces. Results from the analysis are summarized in figure 14 and table 57.

Figure 14 : Pakistan CB&FSA 2008 – food group consumption by FCS values


Source: Pakistan Crop Benchmark & Food Security Assessment WFP, 2008

Table 57 : Average consumption of food groups/items: results by Food Consumption Group and Province

	Cereals	Animal proteins	pulses	milk, milk prod.	vegetables	fruits	Oil	sugar
Poor	7	0	1	0	2	0	5	5
Borderline	7	1	2	0	4	0	6	6
Acceptable	7	2	2	6	4	0	7	6
AJK & FANA	7	2	3	4	4	0	7	6
Balochistan	7	2	2	5	3	0	7	7
NWFP & FATA	7	2	2	4	5	0	7	6
North Punjab	7	2	3	6	4	1	7	6
South Punjab	7	2	2	6	3	1	7	6
Sindh	7	1	2	5	4	0	6	6
Total	7	2	2	5	4	0	6	6

Source: Pakistan Crop Benchmark & Food Security Assessment WFP, 2008

It can be observed that:

- Households with **poor food consumption** eat cereals *daily* and consume oil and sugar *frequently* (i.e., on average 5 days). Other food items are almost absent from the diet of this group. For instance, pulses are consumed one day per week on average; vegetables are consumed two days per week).
- Households with **borderline food consumption** differ from households with ‘poor’ consumption as they have some proteins in the diet. On average they have animal proteins one day per week and pulses twice per week. They also have higher consumption of oil (6), sugar (6) and vegetables (4).
- Consumption of proteins is substantially increased among households with **acceptable food consumption**. It is worth mentioning that milk and dairy products are consumed almost daily in this group whereas they were absent among households with poor and borderline food consumption¹⁷.
- With regard to provincial differences, the consumption of **milk** is higher in North and South Punjab (6 days per week). It is lower in AJK & FANA and NWFP & FATA (4 days per week).

“Milk and milk products are important food items in the Pakistani diet. This is particularly true for the rural population. Milk is generally consumed as fresh, boiled, powdered and processed (UHT, pasteurised). Common milk products are yoghurt, butter, ghee, ice cream, cheese and confectionaries.” (MinFAL, 2008). The table above confirms that ‘acceptable’ food security status is heavily driven by more frequent consumption of milk and milk products.

In Punjab (especially the North), where milk consumption is the highest, there is also the highest average ownership of milk animals (buffaloes) (Table 58). Furthermore, the analysis shows a significant ($p < 0.05$) association between food consumption levels and cattle ownership (Table 59). Households owning no cattle tend to be in the ‘poor’ and ‘borderline’ categories, whereas households who produce for the market tend to be in the ‘acceptable’ category.

Table 58 : Average number of buffaloes and cattle in lactation¹⁸ per household, by Province

Province	Average N of Milking animals	
	buffaloes	cattle
AJK & FANA	0.7	0.1
Balochistan	0.2	0.5
NWFP & FATA	0.4	0.6
North Punjab	2.0	0.5
South Punjab	1.2	0.5
Sindh	1.0	0.2
Total	1.0	0.4

Source: Pakistan Crop Benchmark & Food Security Assessment WFP, 2008

Table 59: Distribution of the food consumption groups by cattle ownership category (%)

Cattle ownership Categories ¹⁹	Food consumption groups (% households)		
	poor	borderline	acceptable
no cattle	4	27	69
consumption oriented cattle owner	2	13	84
market oriented small cattle owner	1	8	91
commercial cattle owner	1	6	93

¹⁷Milk and milk products have the highest weight (4) in the calculation of the FCS, so every additional day it is consumed increases the FCS substantially.

¹⁸ It is assumed that these are animals being milked because the table records dry buffaloes and cows separately.

¹⁹ Consumption oriented cattle owner = 1-3 animals; Market oriented small cattle owner = 4-10 animals; Commercial cattle owner >10 animals

Approximately one third of the sample declared that the first source of milk for the household is the market. This proportion decreases to one fifth for households that own at least one milk buffalo. The fact that some households with milk buffaloes still depend on the market is probably due to seasonal changes in the ability of animals to produce enough milk to fulfil household needs.

Regarding **changes in consumption patterns**, the food price study carried out in May 2008 shows that there were widespread changes in the quality and quantity of food consumed. Forty percent of interviewed households in both urban and rural areas shifted consumption to less preferred foods, including a shift from rice to cheaper wheat. Households were also found to be limiting portion sizes at meals (one fourth). In rural areas, adults reduced their food share for the benefit of the children. The number of meals eaten per day changed with more than 10% of adults and children eating fewer meals per day than six months previously. A majority of adults reported having two meals per day, while $\frac{3}{4}$ of children had 3 to 4 meals per day. A fifth of adults ate only once a day. (FAO et al., 2008, p.28).

The CB & FSA study sample covers small and medium farmers in better-off areas and is therefore not representative of the wider population. Data from the price survey carried out in June 2008, covering a wider range of socio-economic groups, indicated that “Overall, more than one fourth of households were found to have poor food consumption, which means an inadequate diet in terms of quantity and quality. This percentage [...] is very similar to the HIES simulation result of 27% below 1,700 kcal. The percentage of households with poor food consumption is slightly higher in rural areas.” (UN Joint Agency Assessment Mission)

5.3.3 Sources of Food

Analysis of food sources was carried out for each item. For most items, the market is the primary source of access. The only exceptions are milk (discussed in the previous section) and wheat. Table 60 compares the sources of wheat and rice in Food Consumption Groups. Overall, 85 percent of households that consume wheat declared that their primary source is own production, while more than two thirds of households that consume rice purchase it.

Table 60 :Main source of wheat and rice by Food Consumption Group (% of households)

FC Groups	Wheat		Rice	
	Own Prod (%)	Purchase (%)	Own Prod (%)	Purchase (%)
poor	86	13	25	74
borderline	78	22	13	86
acceptable	87	13	33	65
Total	85	14	30	68

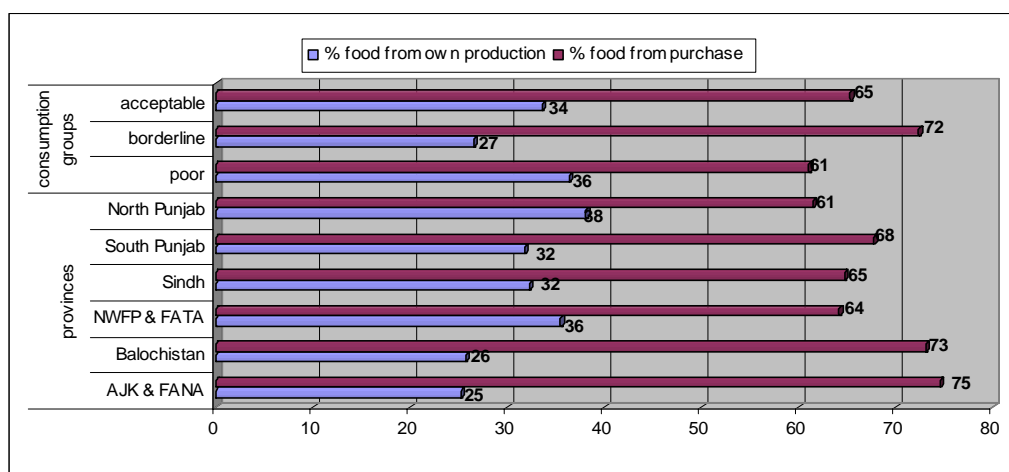
Source: Pakistan Crop Benchmark & Food Security Assessment WFP, 2008

Table 61 : Main source of wheat and rice by province (% of households)

Province	wheat		Rice	
	Own Prod (%)	Purchase (%)	Own Prod (%)	Purchase (%)
AJK & FANA	74	26	2	98
Balochistan	59	40	28	71
NWFP & FATA	90	10	11	89
North Punjab	92	8	76	24
South Punjab	90	9	14	84
Sindh	91	8	17	80
Total	85	14	30	68

Source: Pakistan Crop Benchmark & Food Security Assessment WFP, 2008

The analysis of food sources was carried out by aggregating all items. This analysis confirms that purchase and own production are the main sources of food and that households with acceptable consumption have a higher contribution from own production compared with the borderline group. North Punjab and NWFP & FATA are provinces where own production seem to play a more important role (Figure 15).

Figure 15 : Pakistan CB & FSA 2008 – % food from own production and purchase (global analysis)

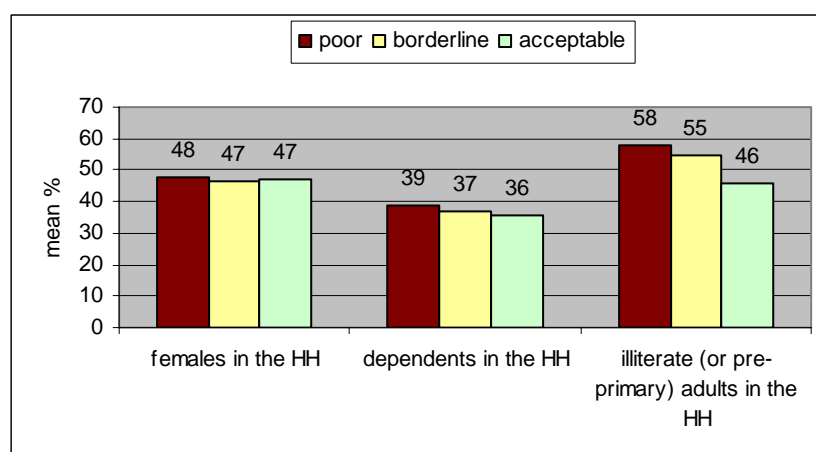
Source: Pakistan Crop Benchmark & Food Security Assessment WFP, 2008

5.3.4 Demographic and Socio-economic profiles of Food Consumption Groups

One of the purposes of a food security analysis is to build a profile of food consumption groups by looking at key demographic, social and economical characteristics.

Demographic factors

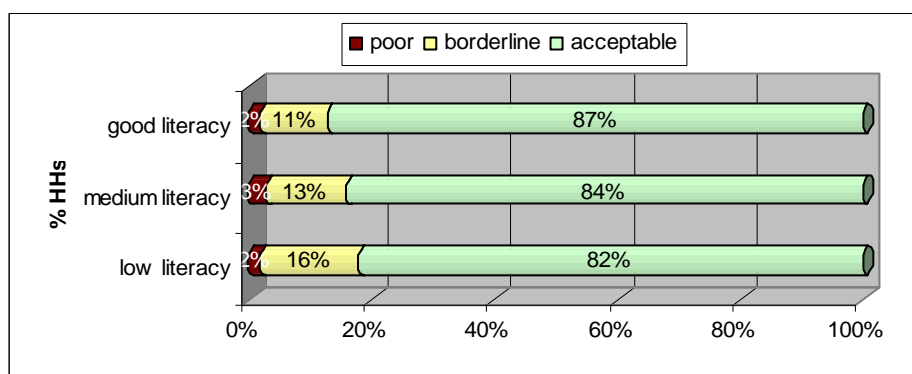
Households with acceptable food consumption show a significantly ($p < 0.05$) lower prevalence of *illiterate* (or with pre-primary) *adult members* compared with poor and borderline households (46% versus 55% and 58% respectively). They also show a significantly lower prevalence of *dependents* (36% versus 37% and 39%, $p < 0.05$). Differences between poor and borderline groups are not statistically significant. The presence of women in the household does not seem to play a key role in determining food consumption groups.

Figure 16 : Key demographic indicators by Food Consumption Group

Source: Pakistan Crop Benchmark & Food Security Assessment WFP, 2008

The analysis confirms the role of *education* in determining household food consumption levels. Indeed, the percentage of the group with acceptable consumption is significantly ($p < 0.05$) higher among households with good literacy levels compared to households with medium and low literacy levels (87% versus 84% and 82%, $p < 0.05$).

The average *age* of the household decision maker and the farm decision maker increases as the food consumption score increases. In particular, the average age of the household decision maker is significantly lower among households with poor consumption compared to the borderline and acceptable groups (44 years old compared with 47 years old, $p < 0.05$).

Figure 17: Distribution of Food Consumption Groups by literacy status

Source: Pakistan Crop Benchmark & Food Security Assessment WFP, 2008

Land, Farm production, Livelihoods

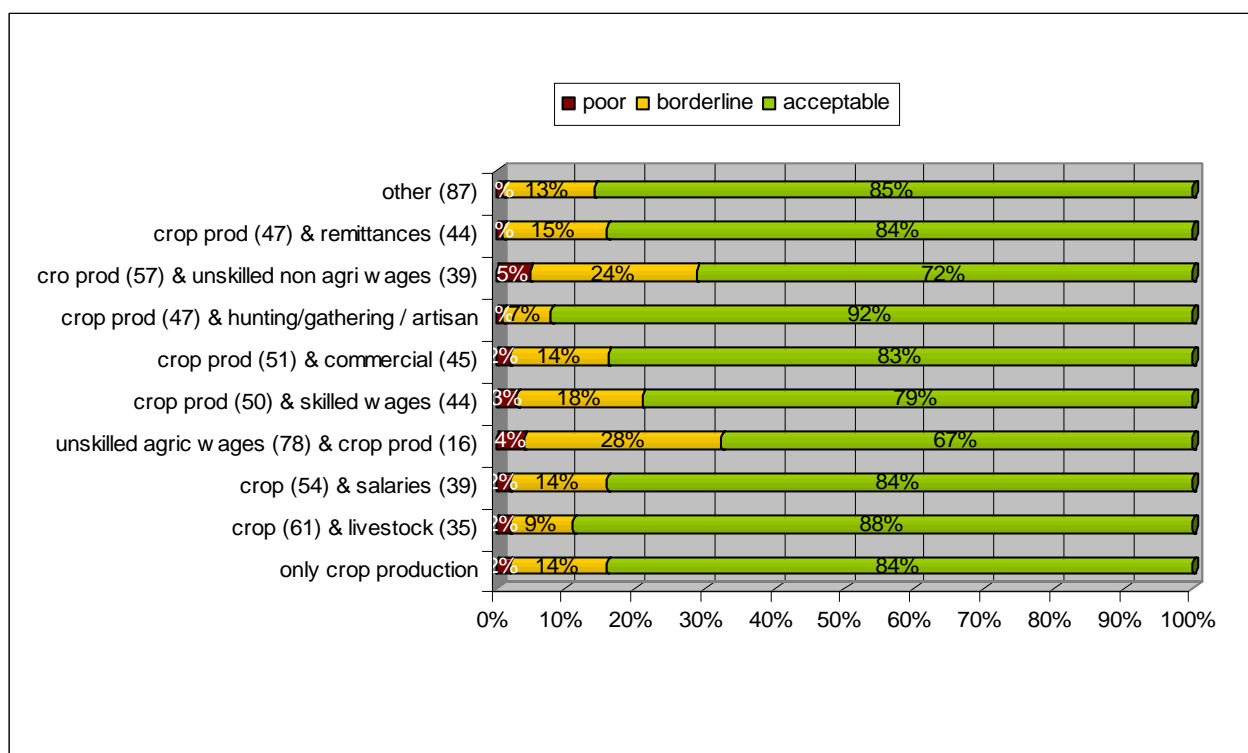
Households with acceptable food consumption tend to *cultivate* a significantly ($p < 0.05$) larger area (8.5 acres) compared with the borderline group (6.3 acres respectively) and they tend to *own* a higher percentage of the operational area (82% compared with 79% of the borderline group, $p < 0.05$).

The analysis looked also at the relationship between food consumption and farm production/land utilization. In particular, amount of wheat yield per acre (kg), wheat area (ha), crop intensity, food crop production intensity and wheat production intensity have been considered. Results from the analysis show that:

- On average *wheat yield 2006/07* (kg per acre) is slightly higher among households with acceptable food consumption compared with households with poor/borderline consumption (1,197 versus 1,140). Differences are not statistically significant, therefore they should not be generalized to all the households in the surveyed villages.
- On average, the amount (ha) of *wheat area* is significantly higher among the acceptable group compared with poor/ borderline groups (2.5 versus 1.9, $p < 0.05$).
- Households with acceptable consumption tend to have a slightly higher *crop intensity coefficient* (151% versus 144%, $p > 0.05$). With regard to the *utilization of land*, households with acceptable consumption tend to cultivate more rice (21% of the operational area) compared with the poor/ borderline groups (9% of the operational area) and cotton (27% versus 21%). Differences are statistically significant ($p < 0.05$). On the other hand, they cultivate less maize (9% versus 15%, $p < 0.05$) and slightly less wheat (67% versus 72%, $p < 0.05$).

The relationship between *livelihood groups* and food consumption has been analyzed in order to identify livelihood profiles that are more likely to have non acceptable food consumption. Results are reported in figure 18 below. Households that rely to a certain extent on unskilled wages (agricultural and non agricultural) are more likely to have either poor or borderline consumption. Together, they represent less than 6 percent of the sample, but they are likely to be much more represented in the population at large.

Higher levels of acceptable food consumption can be found among households that rely on crops and livestock (88% of them have acceptable consumption) and households that rely on crop production and hunting/ gathering/ artisan (92% have acceptable consumption).

Figure 18 : Distribution of Food Consumption Groups (% households) by livelihood group

Source: Pakistan Crop Benchmark & Food Security Assessment WFP, 2008

5.4 Household Vulnerability

5.4.1 Shocks and Coping Mechanisms

The CB&FSA study enquired as to the number of shocks faced by households in the past 12 months, on the perceived effect of these shocks and on the mechanisms employed by households to face the shocks.

Table 62 below provides household distribution by the number of shocks that the household faced in the previous 12 months. Eighty-three percent of households reported no shocks, 16 percent reported one shock. Only 1.5 percent of the entire sample reported more than one shock.

Table 62 : Distribution of households (%) by number of shocks incurred in previous 12 months

	number of shocks mentioned by the HH	Frequency	Valid Percent
Valid	4 shocks	2	0
	3 shocks	25	0.2
	2 shocks	150	1.3
	1 shock	1,854	15.6
	no shock	9,848	82.9
	Total	11,879	100

Source: Pakistan Crop Benchmark & Food Security Assessment WFP, 2008

Incidence of shock has been cross tabulated against wealth, food consumption and residence (Province) in order to see which household is more likely to be hit by shock.

Table 63 opposite shows clearly that the likelihood of incurring a shock depends on the Province of residence. In particular, the incidence of shock is very low in AJK & FANA (5 percent), NWFP & FATA (7 percent) and Sindh (9 percent). It is higher in Balochistan (26 percent) and Punjab (24 percent in the South and 22 percent in the North).

It is interesting to note that shocks do not seem to be a main determinant of food consumption. Indeed, households with acceptable food consumption incurred shock(s) more frequently compared with households with poor consumption (18 percent among the “acceptable” group; 15 percent among the “borderline” group; 11 percent among the “poor” group). Also, exposure to shock does not show a linear relationship with wealth.

In order to contextualize the shock analysis, association between wealth and shock has been “controlled” taking into consideration household residence. The percentage of households with no shock shows a linear increase only in Sindh, where it gradually increases from 88 percent in the poorest wealth quintile to 95 percent in the richest. In other Provinces, prevalence of households with no shock changes from one wealth category to another, but it does not show a linear pattern.

The association between food consumption and shock can be analysed by province. This suggests that:

- In AJK & FANA, Balochistan, and North Punjab, households with acceptable food consumption are less likely to incur a shock.
- The opposite is true in NWFP & FATA, South Punjab and Sindh.

One of the reasons for this lack of clear association between consumption, wealth and shock can be found in the type of shocks mentioned²⁰. Indeed, the most frequently reported shocks/ constraints are not related to household problems, but with natural disasters. The exposure to these shocks may depend more on the geographical location of the households, therefore, rather than on wealth and food consumption.

Table 63 :Percentage of households that faced a shock in the previous 12 months, by Province

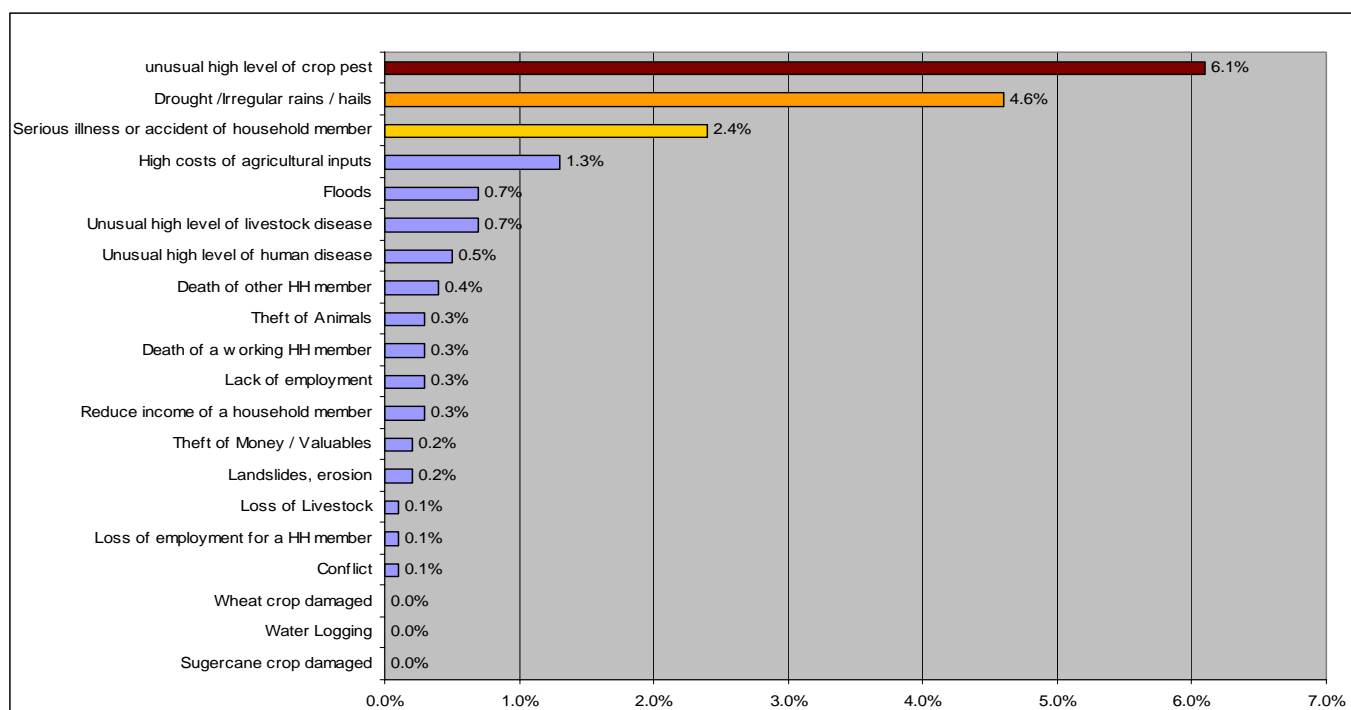
Province	no shock	1 shock	from 2 to 4 shocks	total
AJK & FANA	95	5	0	100
Balochistan	74	25	1	100
NWFP & FATA	93	7	0	100
North Punjab	78	20	2	100
South Punjab	75	21	3	100
Sindh	91	8	1	100

Source: Pakistan Crop Benchmark & Food Security Assessment WFP, 2008

²⁰ Households were asked to mention what shocks they experienced. For the purpose of the assessment and analysis, an event has been considered to be a shock if it actually caused a decrease in the amount of assets, income or both.

Results from the analysis are described in figure 19 below.

Figure 19 : Proportion of households reporting a decrease in income, assets or both due to a shock, by type of shock

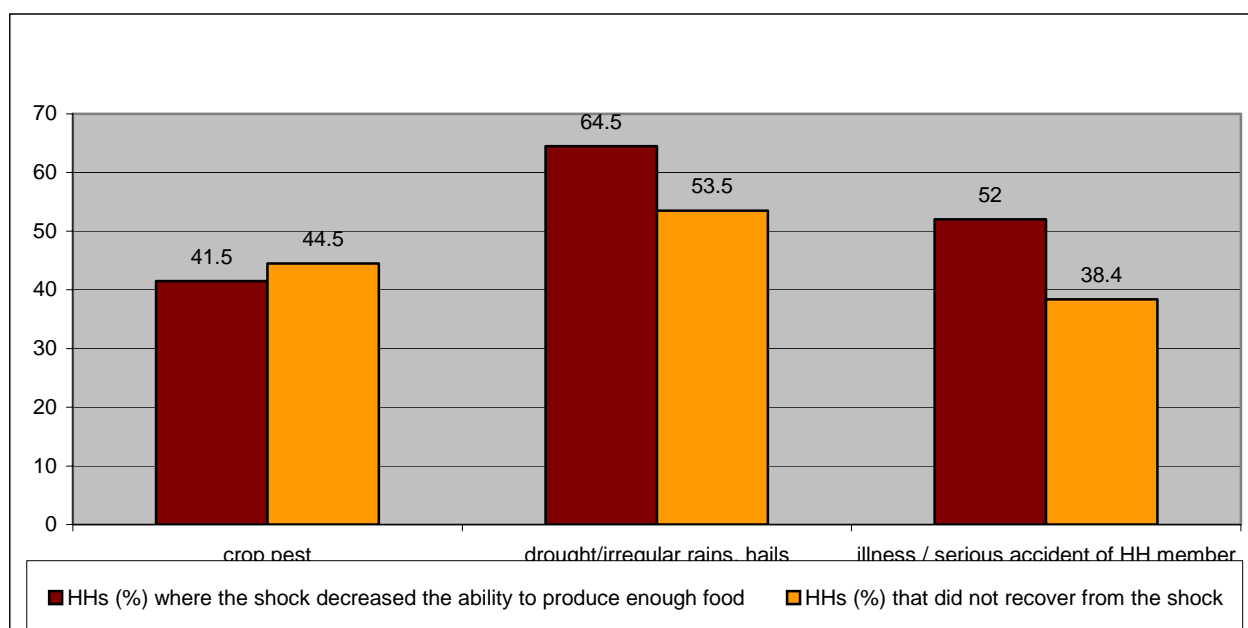


Source: Pakistan Crop Benchmark & Food Security Assessment WFP, 2008

Six percent of households reported to an unusually high level of **crop pests**. Five percent reported **drought, irregular rains or hail**. A further 2.4 percent mentioned serious **illness or accident of a household member**. A detailed analysis has been conducted on the 3 main shocks with the purpose of understanding the severity of such events and the coping mechanisms adopted by the households.

Since few households reported shocks, results on shocks and coping only refer to a minority of households.

It is clear that drought/ irregular rain/ hail has a larger impact on households. Indeed, 64 percent of households that incurred one of these shocks reported that the shock decreased household ability to produce enough food and 53 percent did not recover from the shock. Such percentages are lower for the crop pests and illness/ accident of a HH member.

Figure 20 : Proportion of households for which the shock had a negative impact on food security and which never recovered from the shock (% households that declared a shock)

Source: Pakistan Crop Benchmark & Food Security Assessment WFP, 2008

As mentioned above, one of the objectives of the analysis was to identify the main coping mechanisms applied by households and to see if these vary according to the type of shock.

Table 64 : Frequency of mechanisms applied to cope with shock

	N	% of times coping mechanisms have been applied	% households that declared a shock
borrowed money	807	29	56
spend savings	565	20	39
rely on less preferred food, less expensive food	360	13	25
purchased food on credit	246	9	17
borrowed food, helped by relatives	223	8	16
sold big animals	156	6	11
worked for food only	98	4	7
reduced proportion of meals per day	75	3	5
sold small animals	72	3	5
sold HH articles	36	1	3
reduced number of meals	21	1	2
reduced expenditure on health and education	22	1	2
consumed seed stock held for next season	19	1	1
sold land	10	0	1
sold agricultural tools	7	0	1
Other	51	1	2
TOTAL	2,768	100	193

Source: Pakistan Crop Benchmark & Food Security Assessment WFP, 2008

As illustrated in the two tables above, we can clearly say that:

1. **Borrowing money** is the most frequent coping strategy applied by households (56 percent of households reported borrowing money as a coping strategy and borrowing money was mentioned 29 percent of the time).

2. **Spending savings** is the second strategy in order of importance (39 percent of households reported to use their savings and this coping mechanism was mentioned 20 percent of the time).
3. **Relying on less preferred and less expensive foods** (25 percent of households reported this mechanism and it was mentioned 13% of the time).

Looking at each shock separately, we can see that households tend to react in the same way regardless of the type of shock they have had. The only difference regards “purchasing food on credit”, the relevance of which increases when the shock is drought/ irregular rain/ hail.

Table 65 : Coping strategies: analysis by shock

	Unusual crop pest			drought / irregular rains/Hails			Illness / serious accident		
	N	% responses	% HHs	N	% responses	% HHs	N	% responses	% HHs
rely on less preferred food, less expensive food	171	15%	24%	126	13%	26%	60	10%	22%
purchased food on credit				120	12%	25%			
spent savings	207	18%	30%	192	20%	40%	157	26%	57%
borrowed money	340	29%	49%	276	29%	57%	174	29%	63%

Source: Pakistan Crop Benchmark & Food Security Assessment WFP, 2008

5.4.2 Household Durables and Wealth Index

5.4.2.1 Household Durables

Household durables were recorded with the main objective of constructing an index to estimate household wealth. It is interesting to note that the television set, whether colour or black and white, is the most owned item in the household, followed by the bicycle. Relatively large proportions of the sample owned a washing machine (45 percent), a refrigerator (44 percent) and a motorcycle (32 percent), perhaps confirming once again that the sample is skewed towards better off rural households.

Table 66 : Percentage of households (%) declaring that they own one of the selected assets, by province

Asset	AJK & FANA	Balochistan	NWFP & FATA	North Punjab	South Punjab	Sindh	Total
TV B/W	1	2	6	3	13	6	6
TV colour	78	27	46	82	53	57	56
Refrigerator	51	26	42	71	42	33	44
Washing Mach.	50	31	48	80	35	29	45
VCR/CD/DVD	5	5	5	24	8	10	11
Tape Rec.	15	30	20	28	18	26	24
Computer	2	4	6	9	6	2	5
Air cooler	5	5	13	21	16	4	12
Aircon	1	1	3	7	3	2	3
Bicycle	3	39	62	69	65	28	51
Motorcycle	14	28	16	47	38	28	32
Car	4	5	5	8	5	3	5

Source: Pakistan Crop Benchmark & Food Security Assessment WFP, 2008

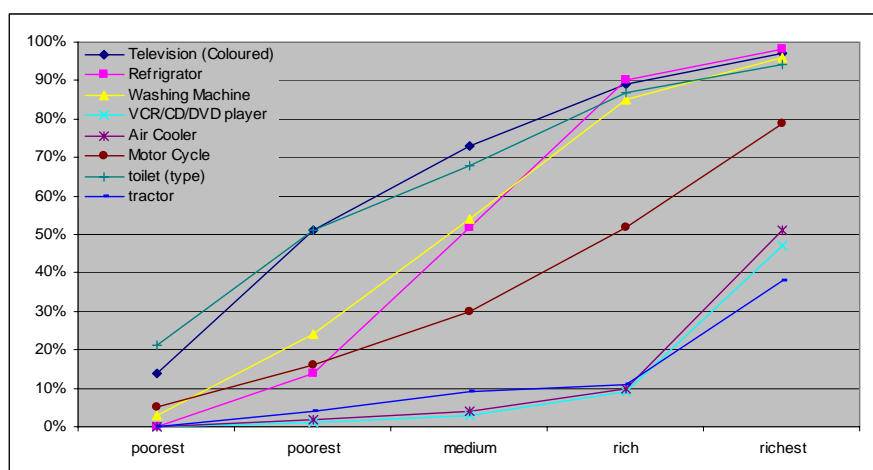
5.4.2.2 Calculation of the Wealth Index

The concept of the Wealth Index (WI) was developed in the context of Demographic and Health Surveys (DHS) and aims to provide a measure of relative economic status believed to be closely correlated to access to services and health status. According to the DHS Wealth Index report²¹, “As a measure of economic status, wealth has several advantages. It represents a more permanent status than does either income or consumption. In the form that it is used, wealth is more easily measured (with only a single respondent needed in most cases) and requires far fewer questions than either consumption expenditures or income.” (p. 4) Furthermore, “The distribution of health services to the poor can be determined by a wealth index as well as or better than an income or expenditure index. This is because of the lower volatility of wealth as compared with that of income and expenditures. In analyzing the distribution of health services (and publicly provided health services), only the relative aspect of economic status is used.” (p. 7)

The methodology used for the computation of the WI is the same as that used in DHS. The variables included in the Pakistan WI are listed in Annex 3.

Other variables were initially considered for the computation of the WI, but were eventually excluded from the index for different reasons (see Annex 3). Principal Component Analysis (PCA) was conducted on the 9 selected variables. The first component was then used as the Wealth Index and divided into quintiles. The first quintile represents the poorest households, the fifth quintile, the better off households. The chart below shows the distribution of assets ownership across the WI quintiles.

Figure 21 : Asset ownership across Wealth Quintiles (% of households)



Source: Pakistan Crop Benchmark & Food Security Assessment WFP, 2008

Table 67 below shows the distribution of households by wealth quintile and by Province. Balochistan appears to have the highest concentration of poor households (59 percent in the two lowest quintiles), followed by Sindh (51 percent in the two lowest quintiles) and NWFP & FATA (48 percent in the two lowest quintiles). North Punjab appears to be the better off province with 71 percent of households in the two highest quintiles, followed by South Punjab with 42 percent of households in the two highest quintiles.

²¹ Rutstein R.O., Johnson K., “The DHS Wealth Index”, DHS comparative reports n.6, ORC Macro, August 2004

Table 67 : Distribution (%) wealth quintiles (% of households) by Province

Provinces	Wealth Quintiles (% of households)						Valid N
	poorest	poor	medium	rich	richest	Total	
AJK & FANA	21	20	32	23	5	100	424
Balochistan	35	24	19	12	9	100	1,256
NWFP & FATA	25	23	22	20	10	100	1,636
North Punjab	3	10	16	31	40	100	2,455
South Punjab	21	20	18	17	25	100	2,268
Sindh	25	26	23	16	10	100	2,370
Total	20	20	20	20	20	100	10,409

Source: Pakistan Crop Benchmark & Food Security Assessment WFP, 2008

5.4.2.3 Characteristics of wealth groups

When estimating household wealth across livelihood groups, it is striking to note that the households that rely mainly on crops and unskilled wages (cluster 4) are concentrated in the poorest quintile (64%). Surprisingly, the households belonging to the group ‘crop production (50) & skilled wages (44)’ appear concentrated in the poorest group.

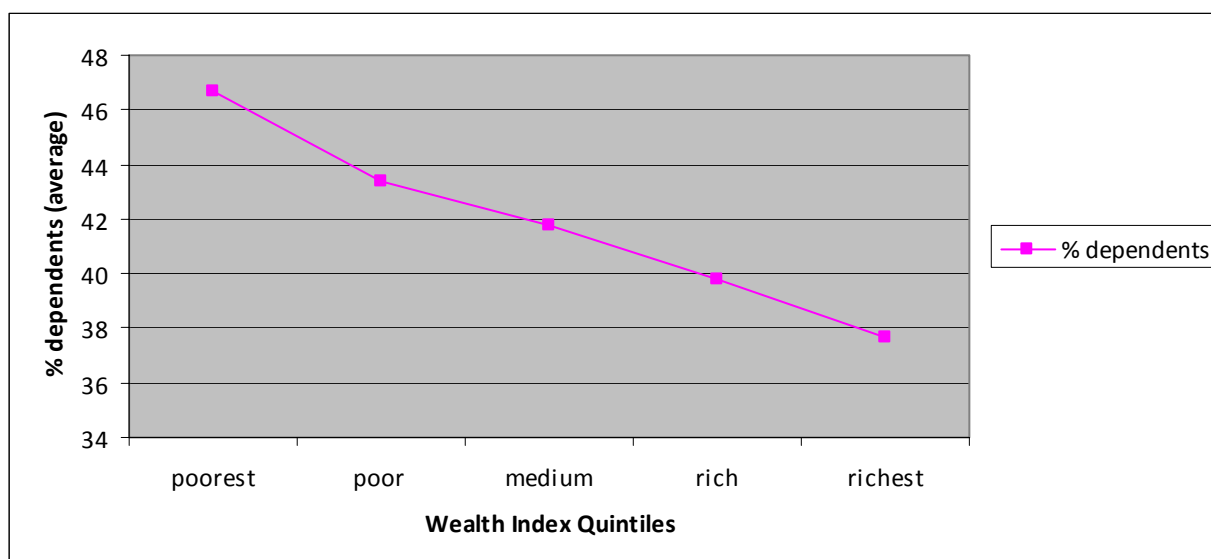
Conversely, better-off groups include those relying on income from remittances and from salaries. This is indicative of the levels of income that can be expected from wages as compared with agricultural production and other types of off-farm employment.

Table 68 : Prevalence of the wealth quintiles (% of households) within the livelihood groups

Livelihood Groups	wealth quintiles (% HHs)					Total	N
	poorest	poor	medium	rich	richest		
1. crop production only	23	20	19	18	20	100	4,084
2. crop prod (61%) & livestock (35%)	15	23	20	18	23	100	2,019
3. crop prod (54%) & salary (39%)	12	16	22	27	23	100	2,105
4. unskilled agric wages (78%) & crop prod (16%)	64	20	11	5	1	100	169
5. crop prod (50%) & skilled wages (44%)	28	27	21	16	7	100	437
6. crop prod (51%) & commercial (45%)	15	16	23	24	22	100	382
7. crop prod (47%) & hunting/gathering (43%)	15	33	25	12	15	100	75
8. crop prod (57%) & unskilled non agric wages (39%)	46	25	15	9	5	100	294
9. crop prod (45%) & artisan (47%)	21	11	32	16	21	100	19
10. crop prod (47%) & remittances (44%)	6	11	23	34	26	100	380
10. other (87%)	19	18	19	15	29	100	206
Total	20	20	20	20	20	100	10,170

Source: Pakistan Crop Benchmark & Food Security Assessment WFP, 2008

Results from the analysis show a clear linear relationship between the percentage of dependents and the wealth quintiles. The percentage of dependents is highest among the poorest (approx 47%) decreasing progressively to 37 percent among the richest (Figure 22).

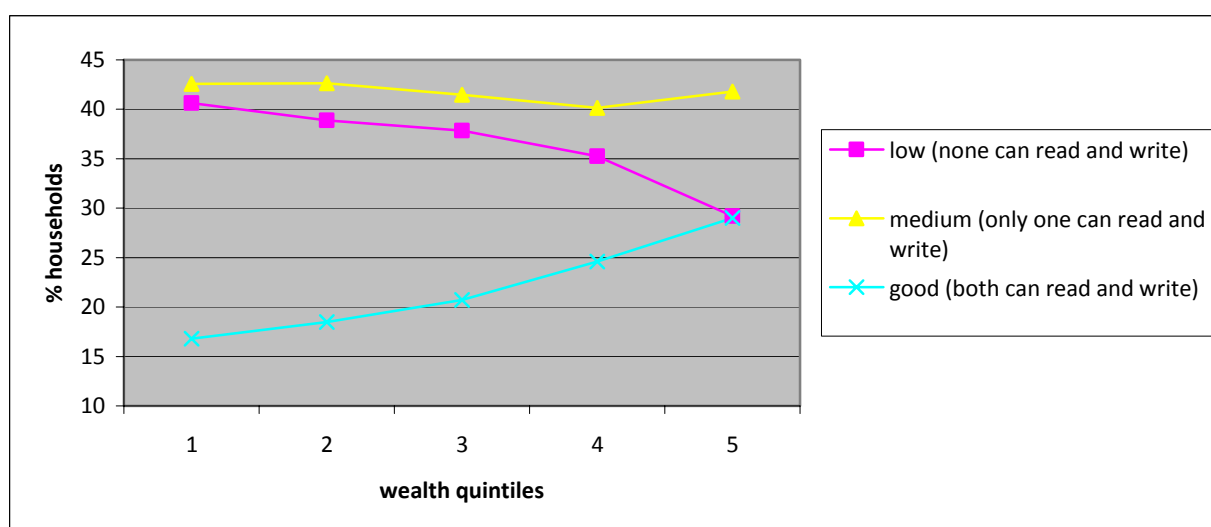
Figure 22 :Percentage of dependents by Wealth Quintile

Source: Pakistan Crop Benchmark & Food Security Assessment WFP, 2008

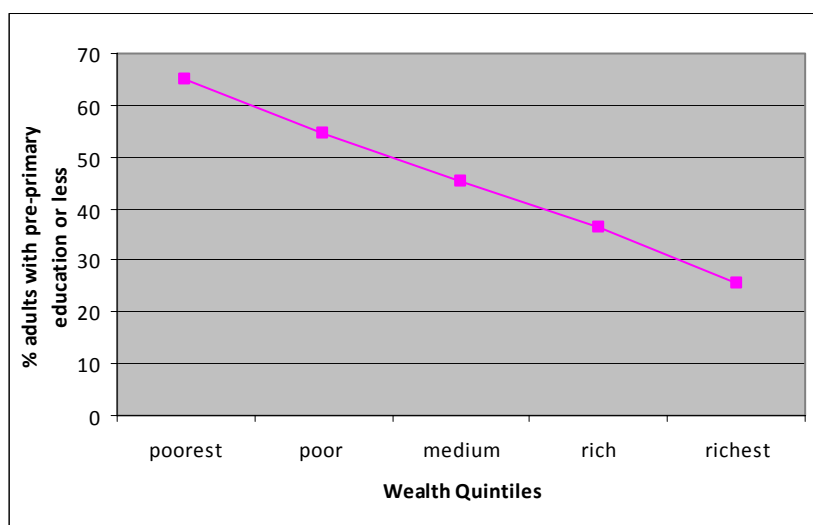
5.4.2.4 Effects of wealth

The relationship between the WI and several key indicators has been explored to understand linkages between wealth and decision making (related to production) and ultimately vulnerability and food consumption.

There is a striking relationship between the WI and the level of education of household members (Figure 22). The percentage of adult (>15 years) members that have either no education or only pre-primary education decreases linearly from 65 percent in the lowest WI group to 26 percent in the highest quintiles. The link between wealth and education is bi-directional: on one hand, poor households are more likely to engage children in on and off farm work (at the expense of education) and tend not to invest on education; on the other hand poorly educated individuals have less chances to build a long-term potential (represented by the wealth index).

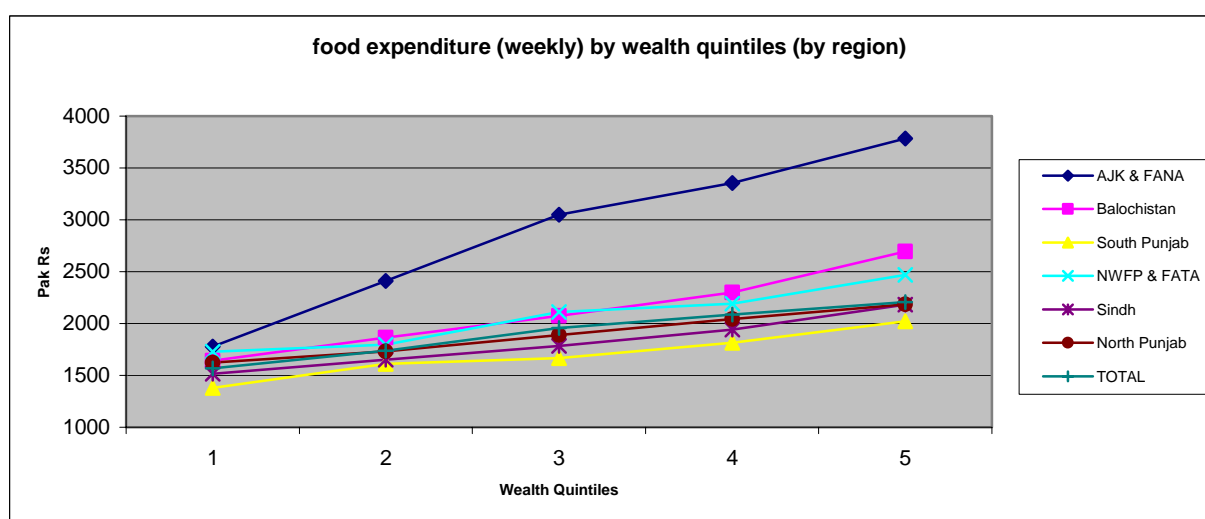
Figure 23 : Distribution of households (%) according to the literacy level of the household head and spouse, by Wealth Quintile

Source: Pakistan Crop Benchmark & Food Security Assessment Report, MINFAL, 2008

Figure 24: Percentage of adult (>15 years) members with pre-primary or no education, by Wealth Quintile

Source: Pakistan Crop Benchmark & Food Security Assessment WFP, 2008

Even though the WI cannot be used as a proxy indicator of purchasing power, it is frequently associated with purchasing capability. Results from the analysis show that wealth is positively associated with the per capita food expenditures (Rps. per week/ per capita). This phenomenon is observed in all Provinces but is most striking in AJK & FANA where food expenses are more than double between the better off and the poorest households (Figure 25).

Figure 25 : Weekly food expenditure by Wealth Quintile, by Province

Source: Pakistan Crop Benchmark & Food Security Assessment WFP, 2008

The relationship between wealth and wheat yields is not linear. From the 3rd quintile, however, we notice an influence of wealth on the amount of wheat yields (Figure 26). This suggests that the household coping potential (as measured by the WI) can play a role in improving yields. As wealth increases, household vulnerability to external shocks decreases. This may be an incentive for farmers to invest in inputs.

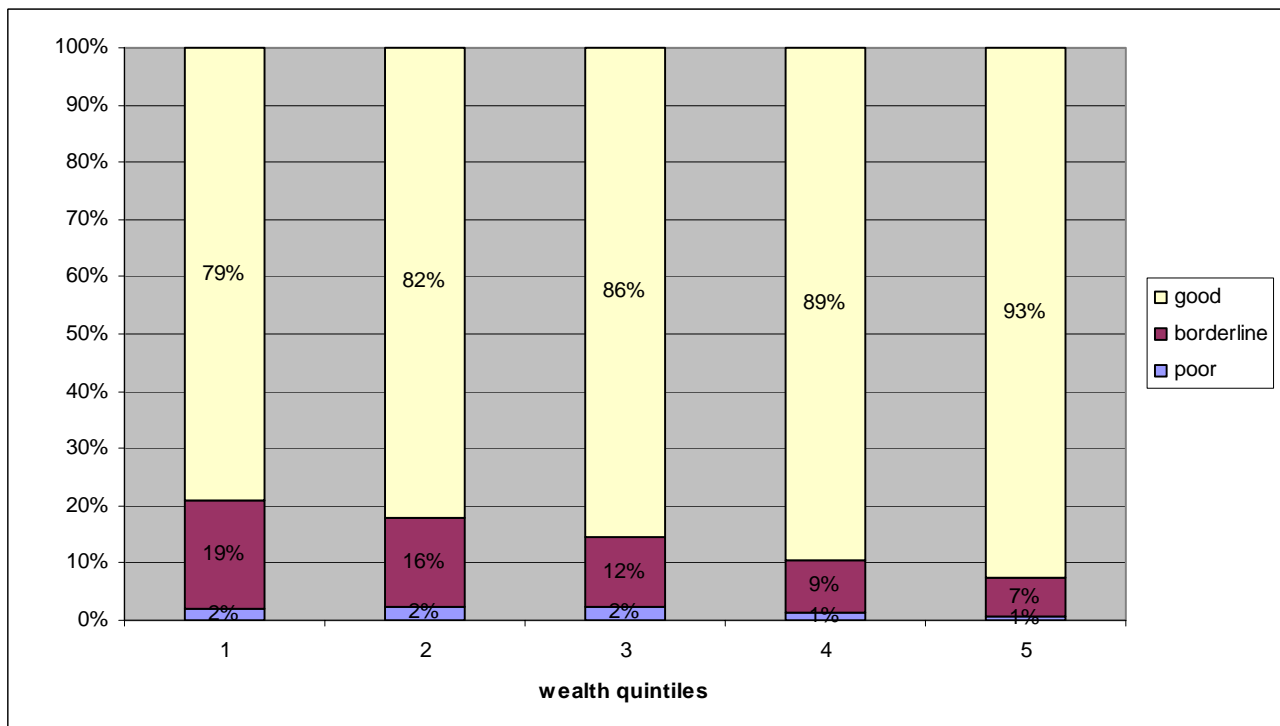
Figure 26 : Average wheat yield (kg/ha) by Wealth Quintile



Source: Pakistan Crop Benchmark & Food Security Assessment WFP, 2008

There is a clear association between wealth and acceptable food consumption (Figure 27). This is likely due to the fact that better off households receive higher yields, own more animals and have higher purchasing power.

Figure 27 :Proportion of households (%) according to their food security group by Wealth Quintile



Source: Pakistan Crop Benchmark & Food Security Assessment WFP, 2008

6 Other factors that could affect nutrition

6.1 Education

Existing studies for Pakistan indicate “an education is positively correlated with the probability of rural-urban migration, labour productivity in the non-farm sector and female labour force participation” (World Bank, RFM study, p. 34). Furthermore, “Econometric analysis of the 2001 Labour Force Survey data suggests that the more educated members of a household are more likely to take paid farm jobs, although marriage tilts this choice towards married men and away from married women. However, as the individual level of schooling increases, he/she becomes less likely to work in paid farm employment and more likely to work in non-farm jobs.” (World Bank, RFM, p. 36) Higher education increases the possibility of reallocating low-skilled labour to other sources of income, particularly non-farm. “According to Fafchamps and Quisumbing (1998)²², 1 additional year of education raises household incomes by 45%.” (WB, RFM study, p. 38)

It is interesting to note that according to the Rural Factor Markets study, large farmers tend to keep their children on the farm to reduce the need for casual labour (which is difficult to supervise) while the landless can forgo children’s labour in favour of school, having an incentive to do so because education can improve future earning capacity.

The report on the socio-economic and livelihood impact of high food prices in rural and urban Pakistan states that Pakistan’s literacy rate (55%) and primary school enrolment rates are low when compared with other countries in the province. They have improved only at a modest pace over the last 5 years, while the gender gap in education remains of serious concern. If enrolment and attendance fall at the primary level, this will have a knock-on effect in the middle and upper levels of school.” The learning outcomes of the education system will, therefore, decline. Reduced enrolment, attendance and completion will impact adversely on Pakistan’s development, undoing the gains – in terms of both poverty reduction and increased literacy rates – made in recent years.

The Net Enrolment Rate (NER) in primary schools (8 years of schooling) increased slightly over the last years and reached 56% in 2006, compared to 52% in 2004. The rate is considerably higher for boys (60%) than for girls (51%). Interestingly, rural areas exhibit higher growth rates in comparison to urban areas. The Gross Enrolment Rate (GER) in primary schools showed a more remarkable increase from 86% to 91% between 2004 and 2006, while GER at the middle school level (age 11- 13) increased from 53% to 59%.

In Pakistan, gender inequality remains pervasive. The country has the highest rate of female illiteracy in South Asia – 71% – and among the lowest percentage of girls enrolled in schools. Female attendance and completion rates tend to be poor, particularly in remote areas where socio-cultural traditions against female education are deep-rooted.

A good indicator for gender gaps is the Gender Parity Index (GPI), which is the ratio of females’ enrolment to the males’ enrolment. A GPI of more than one indicates that, in proportion, for every male in the school, there is more than one female. The GPI for Pakistan as a whole in 2006-07 is 0.63. Province wise the GPI lowest in NWFP and Balochistan, where only 3-4 girls are enrolled in school for every ten boys.” (UN et al., 2008, pp. 33-34)

The education status of household members per sex and age category was investigated using survey data. This indicator is of interest for food security analysis given the expected importance of education levels to reduce vulnerability and food insecurity (as confirmed by the results above). It

²² Fafchamps, Marcel and Agnes R. Quisumbing (1998). Human Capital, Productivity, and Labor Allocation in Rural Pakistan. FCND Discussion Paper No. 48. Food Consumption and Nutrition Division. International Food Policy Research Institute. Washington, D.C.

can give insights into the priority that is given to education, particularly girls, in different geographical areas and types of households and the factors that influence this.

An analysis was performed on the data set and the results were disaggregated by age and sex. Data on education status was recorded for 91,794 household members, representing 98% of all household members in the sample above five years of age.

Looking at the education status by age (Tables 69 and 70), it is interesting to note that the proportion of household members above 15 years of age reporting no education is roughly double than that for members below that age. This may mean that schooling in younger generations has increased. The proportion of members above 15 years of age with an education status below middle school is so low, however, that possibly enumerators may have recorded current schooling status rather than education status.

The data also clearly shows that the education status of males is higher than that of females (Table 71). Indeed, males members who report no education or only pre-primary education represent “only” 42 percent of all male members of the household against 66 percent for females. Overall the proportion of females with no education is roughly double that of their male counterparts. This proportion is roughly reflected in all Provinces, except in AJK & FANA where female members of the household are three times more likely to have no education than male members.

An attempt was also made to investigate net enrolment rates, i.e. the percentage of school age children enrolled in school. Data appraisal has shown great inconsistencies in the data set, however. This is probably due to the fact that the definition “school age children more than 5 years”, meant to define the category 5 to 9 years of age, was misinterpreted by enumerators since there is no upper age limit in the definition.

Table 69 : Percentage of household members between 5 and 15 years by education status and Province

Province	No education	Pre-primary	Primary	Middle	Matric	FA/FSc	BA/BSc	MA/MSc	Prof Edu	Rel Edu	Total
AJK & FANA	2	47	42	9	1	0	0	0	0	0	100
Balochistan	45	34	13	3	0	0	0	0	0	5	100
NWFP & FATA	23	41	29	6	1	0	0	0	0	1	100
North Punjab	9	50	28	10	2	1	0	0	0	0	100
South Punjab	13	47	27	9	2	0	0	0	0	2	100
Sindh	27	37	26	8	1	0	0	0	0	0	100
Total	23	42	25	7	1	0	0	0	0	2	100

Source: Pakistan Crop Benchmark & Food Security Assessment WFP, 2008

Table 70 : Percentage of household members above 15 years of by education status and Province

Province	No education	Pre-primary	Primary	Middle	Matric	FA/FSc	BA/BSc	MA/MSc	Prof Edu	Rel Edu	Total
AJK & FANA	28	1	16	21	20	7	5	2	0	0	100
Balochistan	64	4	8	6	9	4	2	1	0	3	100
NWFP & FATA	57	3	8	8	12	5	4	2	0	0	100
North Punjab	24	5	15	20	21	9	5	2	0	0	100
South Punjab	38	4	15	15	14	6	3	1	0	2	100
Sindh	50	3	13	8	11	7	4	2	0	1	100
Total	44	4	12	12	14	6	4	2	0	1	100

Source: Pakistan Crop Benchmark & Food Security Assessment WFP, 2008

Table 71 : Educational status of females (% of female members) by Province

Province	No education	Pre-primary	Primary	Middle	Matric	FA/FSc	BA/BSc	MA/MSc	Prof Edu	Rel Edu	Total
AJK & FANA	71	47	44	38	30	32	40	43	0	33	46
Balochistan	59	36	27	23	13	16	8	7	9	48	46
NWFP & FATA	64	42	38	24	16	22	24	16	12	48	47
North Punjab	60	48	49	39	35	36	43	41	32	51	46
South Punjab	65	45	43	32	31	27	36	47	9	72	47
Sindh	66	43	38	28	20	16	12	7	5	65	46
Total	63	44	41	32	26	25	28	26	16	59	46

Source: Pakistan Crop Benchmark & Food Security Assessment WFP, 2008

6.2 Living conditions / housing and sanitation

Housing and sanitation influence the nutritional status of household members, hence data was collected on a number of indicators describing household living conditions.

6.2.1 House structure (construction materials)

Table 72 : Distribution of households by typology of house, by Province (%)

Province	Kacha	Packa	Mix	Total	N. households
AJK & FANA	24.9	49.8	25.3	100	490
Balochistan	91.0	5.0	4.0	100	1,689
NWFP & FATA	45.6	26.3	28.1	100	1,902
North Punjab	1.6	70.5	27.8	100	2,553
South Punjab	16.9	53.1	30.1	100	2,478
Sindh	37.2	31.5	31.4	100	2,751
Total	33.8	40.5	25.7	100	11,863

Source: Pakistan Crop Benchmark & Food Security Assessment WFP, 2008

House structure normally reflects the economic status of the family in a particular community. Poor people cannot afford to construct an expensive house. In rural areas, families give high priority to house construction when they get extra income or have generated savings. In many cases, the house structure gives a good idea of the economic status of the community. Poor families have no option but to reside

in *kacha* (mud) houses, the percentage of which tends to reflect the level of poverty of a community. In the project area, around 34 percent of families reside in *kacha* houses, while another 26 percent occupy semi-*packa* (bricks and concrete) houses. Only 41 percent of households live in reasonably well constructed houses. The percentage of families living in *kacha* houses is higher in Balochistan (91 percent) and lowest in North Punjab.

6.2.2 Crowding index

The Crowding Index measures the average number of people per room in each household. It can be an indicator of household wealth and of housing and sanitation conditions. Analysis was made by using both the total number of rooms and the number of bedrooms, because ultimately this is where the inconvenience of crowding may be felt.

Table 73 opposite shows that on average there are 3 people per room and 4 per bedroom. There are important differences between Provinces, however. Households are much more crowded in Balochistan (over 5 people per bedroom) than in AJK & FANA or North Punjab (less than 3 people per bedroom).

Table 73 : Average Crowding Index (CI) by Province

Province	Crowding Index	
	CI (all rooms)	CI (bedrooms only)
AJK & FANA	2.2	2.9
Balochistan	3.6	4.4
NWFP & FATA	2.9	3.8
North Punjab	2.2	2.9
South Punjab	2.9	3.8
Sindh	4.2	5.3
Total	3.1	4.0

Source: Pakistan Crop Benchmark & Food Security Assessment WFP, 2008

6.2.3 Kitchen type

The kitchen is an important place where the cooking is done. The health of the family members depends on hygienic food. The type and location of kitchen reflects the level of awareness of the family members, particularly of women. Moreover, poor people cannot afford to construct a separate kitchen but use open spaces for cooking.

In rural areas, the majority of people use solid fuel for cooking (fuel-wood, grass, dung-cakes etc.), which cause pollution and health hazards for family members. In the project area, less than 50 percent of families use a closed kitchen, while others opt for open or semi-open.

Table 74 : Distribution of households (%) by type of kitchen, by Province (%)

Province	% of households				N
	Open	Semi open	Closed	Total	
AJK & FANA	4.6	29.1	66.3	100	460
Balochistan	21.6	25.6	52.8	100	1,667
NWFP & FATA	19.7	30.5	49.8	100	1,845
North Punjab	3.9	13.4	82.7	100	2,491
South Punjab	46.0	14.0	40.0	100	2,426
Sindh	37.7	46.1	16.1	100	2,714
Total	25.7	26.3	48.0	100	11,603

Source: Pakistan Crop Benchmark & Food Security Assessment WFP, 2008

6.2.4 Kitchen location

Table 75 : Distribution of households (%) by location of kitchen, by Province (%)

Province	% of households			N
	Inside living room	Separate	Total	
AJK & FANA	2.2	97.8	100	457
Balochistan	6.2	93.8	100	1,539
NWFP & FATA	3.9	96.1	100	1,820
North Punjab	5.8	94.2	100	2,310
South Punjab	17.6	82.4	100	2,155
Sindh	6.2	93.8	100	2,579
Total	7.8	92.2	100	10,860

Source: Pakistan Crop Benchmark & Food Security Assessment WFP, 2008

Solid fuels emit smoke and harm family members. Many people cook food in living areas because they have no separate kitchen and because this keeps the living room warm in winter. The data from the project area shows that an encouragingly high proportion (92 percent) of households have a separate kitchen for cooking food.

6.2.5 Energy sources for cooking

Table 76 : Distribution of households by source of energy for cooking, by Province (%)

Province	% of households								N
	Electricity	Gas	Wood	Kerosene oil	Bio gas	Dung cake	Other	Total	
AJK & FANA	0.2	6.4	93.4	0.0	0.0	0.0	0.0	100	482
Balochistan	0.8	3.9	90.6	0.1	0.2	3.6	0.8	100	1,687
NWFP & FATA	0.6	2.3	94.4	0.0	0.2	0.9	1.6	100	1,887
North Punjab	0.9	14.0	56.4	0.4	2.3	19.2	6.8	100	2,542
South Punjab	0.9	1.8	96.1	0.1	0.7	0.2	0.1	100	2,468
Sindh	0.7	11.4	82.2	0.0	0.1	5.5	0.1	100	2,741
Total	0.8	7.2	83.2	0.1	0.7	6.1	1.9	100	11,807

Source: Pakistan Crop Benchmark & Food Security Assessment WFP, 2008

Table 76 shows that wood remains the primary source of energy for cooking in all Provinces. Only North Punjab shows more diversified sources of energy for cooking, in particular dung cake (19 percent) and gas (14 percent). To a lesser extent, Sindh also shows some diversification with 11 percent using gas and 5 percent using dung cakes. Among the available sources, gas is the best non-solid source of fuel and is environmentally friendly. Gas is mostly used in urban and peri-urban areas. Fuel-wood is the major source of fuel for cooking in rural areas. Fuel-wood is comparatively easily accessible either from own fields or from markets. Use of dung cakes reflects the level of poverty of rural households. Those who cannot afford other sources of energy opt for dung cake, instead of using it as a farm manure.

6.2.6 Energy sources for lighting

Table 77 : Distribution of households by type of energy for lighting, by Province (%)

Province	% of households								N
	Electricity	Gas	Wood	Kerosene oil	Bio gas	Dung cake	Other	Total	
AJK & FANA	99.8	0.0	0.2	0.0	0.0	0.0	0.0	100	482
Balochistan	90.0	0.2	1.1	8.5	0.1	0.0	0.1	100	1,685
NWFP & FATA	99.1	0.0	0.4	0.4	0.0	0.0	0.1	100	1,881
North Punjab	98.5	0.8	0.4	0.1	0.0	0.1	0.1	100	2,543
South Punjab	96.1	0.5	0.7	2.6	0.0	0.1	0.0	100	2,442
Sindh	94.8	0.3	1.5	3.2	0.0	0.1	0.1	100	2,735
Total	96.1	0.4	0.8	2.6	0.0	0.1	0.1	100	11,768

Source: Pakistan Crop Benchmark & Food Security Assessment WFP, 2008

Table 77 above shows that electrification is virtually universal in rural Pakistan, with the exception of Balochistan, where over 8% of the sample (12 villages) did not have electricity. Where electricity exists, only a small proportion of households use other sources of energy. Electricity is the most expensive source of energy for cooking, while the supply of electricity is not regular in remote rural areas.

6.2.7 Energy sources for heating

Table 78 : Distribution of households by type of energy for heating, by Province (%)

Province	% of households								N
	Electricity	Gas	Wood	Kerosene oil	Bio gas	Dung cake	Other	Total	
AJK & FANA	0.5	0.0	99.3	0.0	0.0	0.0	0.2	100	442
Balochistan	1.3	3.7	93.8	0.1	0.1	0.5	0.4	100	1,628
NWFP & FATA	2.0	0.8	95.6	0.0	0.2	0.3	1.1	100	1,307
North Punjab	1.9	13.4	55.4	0.2	0.1	22.5	6.6	100	2,071
South Punjab	2.4	2.1	93.5	0.1	1.0	0.2	0.8	100	1,446
Sindh	0.7	8.5	86.6	0.0	0.0	4.0	0.1	100	2,668
Total	1.5	6.3	83.9	0.1	0.2	6.1	1.8	100	9,562

Source: Pakistan Crop Benchmark & Food Security Assessment WFP, 2008

Table 78 above shows the type of fuel used for heating. The high number of missing cases (21 percent) for this variable may refer to households living in areas with a mild climate who therefore do not need heating. Missing cases are particularly important in South Punjab (44 percent), NWFP & FATA (32 percent) and North Punjab (20 percent).

6.2.8 Source of drinking water

Table 79 : Distribution of households by source of drinking water, by Province (%)

Province	% households							N
	Piped water	Hand/motor pump	Open home well	Outside well	spring	others	Total	
AJK & FANA	18.4	18.6	2.5	2.5	57.6	0.4	100	483
Balochistan	8.8	14.2	9.4	28.2	2.4	37.1	100	1,674
NWFP & FATA	10.1	61.3	25.7	2.2	0.4	0.3	100	1,886
North Punjab	3.5	90.1	0.7	5.5	0.1	0.1	100	2,541
South Punjab	1.9	95.7	0.7	1.3	0.1	0.4	100	2,416
Sindh	2.6	93.3	0.9	1.6	0.1	1.4	100	2,730
Total	5.4	73.6	6.1	6.3	2.8	5.8	100	11,730

Source: Pakistan Crop Benchmark & Food Security Assessment WFP, 2008

Table 79 shows that in rural Pakistan most households do not have access to piped water and therefore use their own supply sources. The typology used to describe water sources does not allow us to draw conclusions as to the safety of the water supply or on potential implications for the household health. It is presumed that ‘Open Home Well’ refers to a well dug in the household compound while ‘Outside Well’ refers to a public well or private well constructed by others for common use. In Balochistan a high proportion (37 percent) of households mentioned in “other” are actually fetching water from *karezes*, used for irrigation as well as for drinking water.

6.2.9 Type of toilet

Table 80 : Distribution of households by type of toilet used, by Province (%)

Province	% households					N
	Flush public sewerage	Flush with pit	Dry latrine/toilet	No toilet	Total	
AJK & FANA	13.8	43.5	34.4	8.3	100	457
Balochistan	0.3	24.7	34.5	40.5	100	1,565
NWFP & FATA	10.5	35.9	33.5	20.2	100	1,818
North Punjab	23.9	71.9	1.8	2.4	100	2,514
South Punjab	15.9	62.5	4.9	16.8	100	2,376
Sindh	9.6	43.7	27.3	19.4	100	2,649
Total	13.1	50.0	19.2	17.7	100	11,379

Source: Pakistan Crop Benchmark & Food Security Assessment WFP, 2008

According to the data shown above (Table 80), it appears that nearly 18 percent of households in rural Pakistan do not have access to a toilet, the situation being more serious in Balochistan, where over 40 percent of households lack access. In NWFP & FATA and Sindh this proportion is approximately 20 percent. The dry latrine with open ledge is not hygienic unless treated on regular basis. Many people do not have access to toilets at all. The cause of diarrhoeal diseases is mostly due to the use of improper toilet facilities, common in rural areas, particularly in the poorest areas of the country. The presence of a flush toilet (both with sewerage and with pit) was used as a variable in the computation of the Wealth Index.

6.2.10 Household connected to drainage system

Table 81 : Distribution of households by existence of a connection to a drainage system, by Province (%)

Province	% of households			N
	Drainage	No Drainage	Total	
AJK & FANA	0.6	99.4	100	490
Balochistan	1.4	98.6	100	1,689
NWFP & FATA	20.7	79.3	100	1,902
North Punjab	68.9	31.1	100	2,553
South Punjab	27.7	72.3	100	2,478
Sindh	16.5	83.5	100	2,751
Total	28.0	72.0	100	11,863

Source: Pakistan Crop Benchmark & Food Security Assessment WFP, 2008

Good drainage is an integral part of a good sanitation system. In rural areas, water drainage does not exist and thus waste water pollutes the streets and spreads dirt. Stagnant water becomes a breeding ground for mosquitoes and seeps into shallow wells resulting in the pollution of drinking water. In those areas health issues are severe and people are subject to various diseases. The table shows that only in North Punjab, where over two thirds of the sample report the existence of a connection to drainage, public drainage systems cover the majority of locations.

6.2.11 Livestock shed separate from house

The separation of livestock from the human living area is an indicator of improved household sanitation. Overall, half of the sample households keep the animal shed inside the house. In some cases, livestock are kept within the living rooms. Only in North Punjab, are animals overwhelmingly kept separate from the house.

Table 82 : Distribution of households by whether the livestock shed is separate from or inside compound, by Province (%)

Province	% of households			N
	Separate	Inside	Total	
AJK & FANA	59.2	40.8	100	490
Balochistan	30.7	69.3	100	1,689
NWFP & FATA	30.8	69.2	100	1,902
North Punjab	76.1	23.9	100	2,553
South Punjab	53.0	47.0	100	2,478
Sindh	43.7	56.3	100	2,751
Total	49.3	50.7	100	11,863

Source: Pakistan Crop Benchmark & Food Security Assessment WFP, 2008

Farming families with limited space and money can not afford a separate shed for animals and normally share the space used for human activities with livestock. In areas like Balochistan, AJK and FANA, availability of space for livestock is a serious issue. The cold temperatures in winter is another reason families keep livestock close to the living area.

6.2.12 Animal's housing in human living area

Table 83 : Distribution of households by whether animals are kept in the human living area or separate from it, by Province (%)

Province	% households			N
	Inside	Separate	Total	
AJK & FANA	1.2	98.8	100	490
Balochistan	48.1	51.9	100	1,689
NWFP & FATA	13.7	86.3	100	1,902
North Punjab	3.4	96.6	100	2,553
South Punjab	28.1	71.9	100	2,478
Sindh	27.2	72.8	100	2,751
Total	22.0	78.0	100	11,863

Source: Pakistan Crop Benchmark & Food Security Assessment WFP, 2008

Keeping livestock in living areas is a matter of space and consequently poverty. Families with a limited number of livestock and small houses can not afford to construct additional sheds or rooms for livestock. They prefer to keep the livestock within their living area. This can result the transmission of a number of diseases to humans through respiration or dung.

7 Conclusions and recommendations

7.1 Vulnerability and food security

The results of the analysis suggest that food insecurity is a concern for farmers in the surveyed area, however, families have better food diversity (only 4 percent of households have poor food consumption and 14 percent have borderline levels). On the other hand, expenditure on food has increased increasing pressure on families to meet other non-food needs, such as education, health and domestic items.

Demographic factors:

Punjab has the highest levels of acceptable consumption. In AJK & FANA, Balochistan and NWFP & FATA, between a fifth and a quarter of households have 'borderline' consumption.

The analysis confirmed the role of *education* in determining food consumption levels. The percentage of people with acceptable food consumption was significantly ($p<0.05$) higher among households with good literacy levels compared to households with medium and low literacy levels (87% versus 84% and 82%, $p<0.05$).

The data showed a significantly lower prevalence of *dependents* (36% versus 37% and 39%, $p<0.05$) among households with acceptable food consumption. The average *age* of the household decision maker and the farm decision maker increased as the food consumption score increased.

Land, Farm production:

Households with acceptable food consumption tended to *cultivate* a significant ($p<0.05$) larger area (8.5 acres) compared with the borderline group (6.3 acres respectively), and they tended to *own* a higher percentage of the operational area (82% compared with 79% of the borderline group, $p<0.05$).

On average *wheat yield 2006/07* (kg per acre) was slightly higher among households with acceptable food consumption compared with households with poor/ borderline consumption (1,197 versus 1,140, $p>0.05$).

On average, the amount (ha) of *wheat area* is significantly higher among the acceptable group compared with the poor/ borderline groups (2.5 versus 1.9, $p<0.05$). Households with acceptable consumption tend to have slightly higher *crop intensity coefficient* (151% versus 144%, $p>0.05$). With regard to *utilization of land*, households with acceptable consumption tend to cultivate more rice (21% of the operational area) compared with the poor/ borderline groups (9% of the operational area) and cotton (27% versus 21%). Differences are statistically significant ($p<0.05$). On the other hand, they cultivate less maize (9% versus 15%, $p<0.05$) and slightly less wheat (67% versus 72%, $p<0.05$).

Livelihood profile:

Households that rely on unskilled wages (agricultural and non agricultural) are more likely to have poor/ borderline food consumption. Together, they represent less than 6 percent of the sample, but they are likely to be much more represented in the population at large.

Higher levels of acceptable food consumption can be found among households that rely on crop and livestock (88% have acceptable food consumption) and households that rely on crop production and hunting/gathering/artisan (92% have acceptable food consumption).

Households that can only rely on unskilled agricultural wages to supplement their meagre crop production from small plots are most likely to have borderline food security status, and are therefore more at risk of facing a food crisis. These households are vulnerable to various shocks, particularly those that may cause increases in food and non-food prices or drops in crop production. Since less

than one third of rural households own land, and out of these two thirds own less than 5 acres, the survey data may just show the tip of the iceberg.

This conclusion is specific to the project area, predominantly located in irrigated areas with reasonably good soils. The survey was conducted during harvest season when prices are relatively lower, therefore, conclusions cannot be generalised for the country at large. The data shows that household food security status is determined by consumption of, and access to, milk and milk products.

On the other hand, the vulnerability of farming households, as indicated by their wealth status, appears to be an important determinant of their willingness to invest resources in order to increase crop productivity. The data indicates that households prefer to diversify their income sources than invest in the highly risky business of crop production, in an environment in which water supply is unreliable and prices of inputs and outputs are highly volatile. In fact, average household income is higher when members have additional sources of income such as from permanent employment, skilled wages, commercial activities or remittances.

Access to health services and housing and sanitation conditions also affects the food security of the household. Better health services, reasonably constructed houses and improved sanitation lead to a healthy and productive nation.

Finally, the data confirms that education is a major determining factor in reducing household vulnerability and improving food security. This is because educated people are more likely to have higher incomes, send their children to school and live in improved housing and sanitation conditions.

7.2 Constraints to Increasing Crop Production

The analysis of the survey data identified a number of constraints to crop, particularly wheat, production, in the study area:

- ☞ **Cost of agricultural inputs** (seeds, fertilizer, pesticides) represents a substantial proportion of total production costs and is not always justified by returns. As a result, more than half of the farmers do not use improved seeds. This issue is particularly relevant in AJK and in Punjab, where fertilizer is applied at much lower than recommended rates.
- ☞ **Land preparation is inadequate:** Less than 7 percent of farmers use a chisel plough and less than 4% use zero tillage to prepare their land despite the fact that this can significantly improve yields. The reasons for this are both availability and affordability. A farmer who does not own a tractor and/ or a plough will have to rent. Not only is this expensive but after deep ploughing the land will require soil levelling and seed bed preparation, both of which imply additional costs.
- ☞ **Low returns to investment:** Production costs are very high and leave approximately 4,000-5,000 Rs per acre to remunerate family labour. Despite Government efforts to keep input and grain prices at acceptable levels, farmers have faced major increases in all other production costs.
- ☞ **Small farm sizes are not economical:** Inadequate revenues per acre, coupled with small cultivated land area limits the total income that can be derived from agriculture. Only farmers with off-farm sources of income can make ends meet.
- ☞ **Unreliability of water supply** for irrigation means that farmers, especially those at the tail end of canals, reduce inputs in order to minimise production risks. The situation is likely to worsen this year and in the coming years because of climate change.
- ☞ **Competition between crops:** high cropping intensity hides risk. Farmers may be unable to clear the fields in time to sow the following crop. Delays in harvesting sugarcane, cotton or paddy are not infrequent reducing time available to prepare the land for wheat, or forcing

them to skip the wheat crop altogether. This year, the problem is compounded by frequent power cuts, which have dramatically reduced the processing capacity of cotton ginneries. Delays in the cotton harvest are likely to cause a decrease in the area under wheat this year.

7.3 Interventions for increasing crop productivity

Credit: As resource constrained farmers use fewer than recommended inputs and do not adequately prepare their land for lack of own farm implements, one may be tempted to advocate for improving their access to inputs and implements through credit. The data shows that, with the exception of Sindh, less than one third of households have had access to credit in the past two years. Investments in agriculture are relatively risky, however, and increasing credit may put farmers, especially the poorest and most vulnerable, in a vicious cycle of indebtedness.

Inputs: Interventions that reduce production risks, for instance by smoothening fluctuations of input and output prices, or by insuring against risk are more likely to lead to productivity increases. An integrated farming support mechanism should be developed in order to provide inputs to the vulnerable through a single operating unit in different areas.

During the survey it was observed that a considerable amount of farm manure is converted into dung cake as a cheap source of fuel for poor families. The project should introduce cheaper sources of energy in the area in order to allow the maximum accumulation of farm manure for crops.

Water: Adequate water availability for crop production needs special attention. Efforts should be made to minimize water losses and protect areas from water logging. Improvement in water courses and changing from traditional water harvesting are important factors for productivity enhancement and increase in crop areas. Improving water use efficiency should also increase the reliability of water supply if farmers at the head of canals have less reason to take more than their share.

Seed: Seed multiplication and storage should be organised at district or community level. Local NGOs can play a greater role in meeting demand. The project should provide seed money to local NGOs to develop mechanisms for seed multiplication, storage and distribution. The storage might play the role of seed bank at the district/tehsil/community level.

Any action should take into consideration differences between households in terms of size of farmland.

- ☞ **Small farmers** can not afford production risks and have little to invest in crop production. Farmers with small landholdings (below 5 acres) should be provided with a relief package in order to guarantee a minimum income to support their families. These packages could be made conditional on household participation in asset building initiatives. For instance, poor households may be offered free inputs on the condition that they send their children to school and/or vaccinate them and/or re-invest part of the resulting additional income in activities to further stimulate production and/or create local added value (e.g. improvements in irrigation infrastructure, village banks, small processing factory, storage structures, etc.).
- ☞ **Tenants** are always at risk to lose their land and therefore have less interest in future investment. Tenants are high in numbers, playing a significant role in the agricultural growth. Tenant protection is important in terms of food security and livelihoods sustainability. Subsidies should be provided directly to tenants rather than owners and tenants should have greater control over the sale of farm produce. To achieve this, it is important that landless tenants join formal farmer organisations supported by MinFAL.
- ☞ The **landless** constitute a significant percentage of the population in the project area and should not be excluded from the benefits of the project. They support the agriculture sector through transport, skilled and unskilled labour, marketing, equipment repair and other

services. The project should focus on small business development in the area to ensure the landless receive an income.

7.4 Benchmark indicators

The following benchmark indicators are proposed to measure the effects of the CMPII on productivity and food security. They are subdivided into two main categories: 1) Productivity and income; 2) Wealth and food security.

In order to obtain this information it is important to measure the achievement of intermediary results related to the access to, and use of, inputs and technology by households.

7.4.1 Productivity and incomes

- ☞ Average yields of wheat and other major crops-----see Table 36 and additional tables
- ☞ Average net income from crop production-----see Figure 9
- ☞ Average net income from the farm-----see Figure 10

7.4.2 Wealth and food security

- ☞ Development of productive assets-----see Table 66
- ☞ Diversification of food intake-----see Figures 12 and 13, Table 57
- ☞ Improvements in health and hygiene conditions -----see Tables 72 to 83
- ☞ Literacy levels of household head and spouse-----see Tables 12 and 13, Figure 2
- ☞ Number of children enrolled in school-----see Tables 69 and 70

7.4.3 Access to, and use of, inputs and technology

- ☞ Level of fertilizer usage in main crops-----see Tables 32 and 33
- ☞ Level of improved seed for crop production-----see Tables 30 and 31
- ☞ Level of farm mechanization-usage of better technology-----see Table 29
- ☞ Farmers satisfied with access to inputs (reduce the role of middle man) and quality of water supply -----see Figure 11
- ☞ Level of crop specialization or zoning-----see Table 38
- ☞ Percentage of farmers adopting water harvesting techniques-----see Table 20

7.5 Second round of survey

The survey should be repeated after a period of 1-2 years in order to assess improvements in household food security and baseline indicators responsible for crop production enhancement.

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ANNEX 2 : Household Food Consumption Score (FCS)

The “Food Consumption Score” (FCS) is a score calculated using the frequency of consumption of different food groups consumed by a household during the 7 days before the survey. Method of calculation is as follows:

- Using standard 7-day food frequency data, all the food items are grouped into specific food groups.
- Consumption frequencies of food items of the same group are summed up; values of each group above 7 are recoded as 7.
- The value obtained for each food group is multiplied by its weight; new weighted food group scores are created
- The weighted food group scores are summed up, thus creating the food consumption score (FCS).
- Using the appropriate thresholds, food consumption score is recoded from a continuous variable to a categorical variable.

Standard Food Groups and weights used in all analyses are reported below:

<i>Food groups</i>	<i>Weight</i>
Staples	2
Pulses	3
Vegetables	1
Fruit	1
Meat and fish	4
Milk	4
Sugar	0.5
Oil	0.5
Condiments	0

The typical thresholds for the FCGs are:

FCS	Group labels
0-21	Poor
21.5-35	Borderline
>35	Acceptable

However, in countries with high consumption of oil and sugar, the 21 and 35 thresholds are usually shifted to 28 and 42 because it increases artificially the FCS values. In the context of Pakistan sugar and oil are consumed almost daily (see table below). This justifies the shift of the standard thresholds from 21, 35 to 28, 42.

	mean consumption of food items							
	Cereals, tubers	meat, fish, eggs	pulses	milk, milk products	vegetables	fruits	Oil, fats	sugar
AJK & FANA	7	2	3	4	4	0	7	6
Balochistan	7	2	2	5	3	0	7	7
NWFP & FATA	7	2	2	4	5	0	7	6
Sindh	7	1	2	5	4	0	6	6
South Punjab	7	2	2	6	3	1	7	6
North Punjab	7	2	3	6	4	1	7	6
Total	7	2	2	5	4	0	6	6

Source: Pakistan Crop Benchmark & Food Security Assessment Report, MINFAL, 2008

Detailed guidance on how to compute is reported in WFP ODAV, 2008, Food Consumption Analysis: Calculation and use of the Food Consumption Score in the Food Security Analysis.

ANNEX 3 : Wealth Index (WI)

The Wealth Index (WI) is a composite measure of the living standard of a household. It is calculated using data on household's ownership of selected assets, housing facilities, savings, etc. The Wealth Index is used recently introduced in the DHS and AIS surveys and is presented in the Final Reports and survey datasets as a background characteristic.

Generated with a statistical procedure known as principal components analysis (PCA), the Wealth Index rank households on a continuous scale of relative wealth. The methodology used for the computation of the Wealth Index (WI) is the same as the Demographic and Health Surveys (DHS).

The variables included in the Pakistan WI are:

1. ownership of coloured TV
2. ownership of refrigerator
3. ownership of washing machine
4. ownership of a VCR/CD/DVD player
5. ownership of air cooler
6. ownership of motor cycle
7. ownership of improved toilet (flush)
8. ownership of tractor
9. farm size

PCA was conducted on the 9 selected variables. The first component has been then used as Wealth Index and divided in quintiles. Other variables were initially considered for the computation of the WI, but eventually they have been excluded from the index. Reasons are hereinafter reported:

Variables	Reasons for exclusion
livestock (only milk buffaloes)	weak correlation with other variables, poor contribution to the WI
heating (recoded: dung vs other sources)	weak correlation with other variables, poor contribution to the WI
energy sources for cooking	no weak correlation with other variables, poor contribution to the WI
Car	frequency distribution not appropriate
Computer (PC)	frequency distribution not appropriate
Bicycle	weak correlation with other variables, poor contribution to the WI
percentage of farm land owned (out of the total operational area)	weak correlation with other variables, poor contribution to the WI
number of laborers employed at the household	Not available in the data set
saving (presence or amount)	weak correlation with other variables
tenancy recoded	weak correlation with other variables
source of drinking water	options cannot be distinguished between improved/not improved
Tape Recorder	weak correlation with other variables, poor contribution to the WI
Air Conditioner	frequency distribution not appropriate
Television (Black & White)	frequency distribution not appropriate
Lighting	frequency distribution not appropriate

ANNEX 4 : Livelihood Profiles

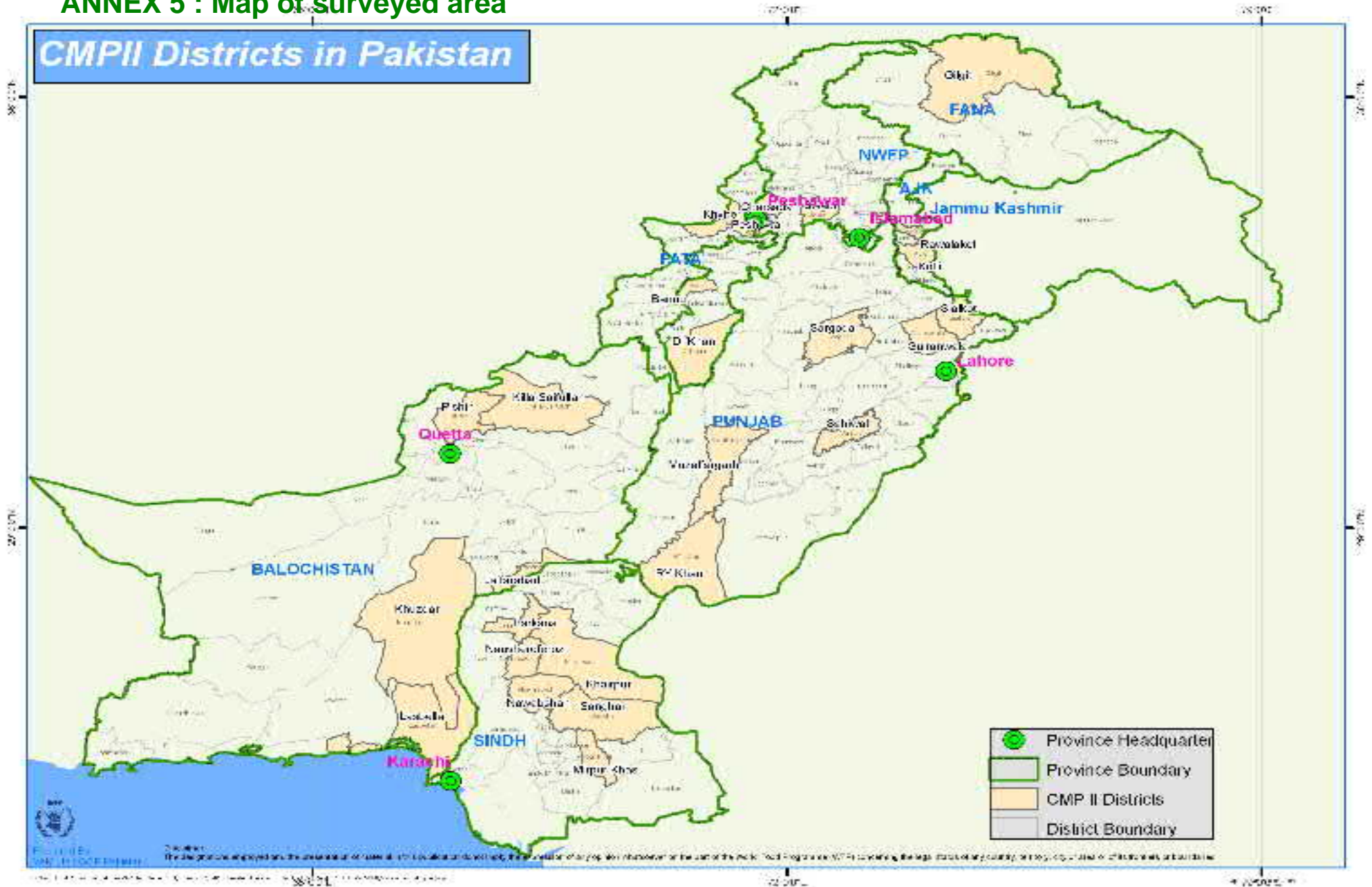
Information on the three main income activities and their contribution to the household total income has been used to identify groups of households that share similar livelihood profiles.

Some livelihood activities (business and selling; brewing and artisan; remittances and allowance; hunting, fishing and gathering) have been aggregated because they were mentioned by a minor number of households.

First, 12 variables were created, each reporting the activity's contribution (%) to the total income. A PCA was conducted on the 12 variables. All the components extracted through the PCA have been used for the classification. Cluster analysis (conducted in ADDATI) identified 11 clusters. The table below provides a profile for each cluster. In particular, for each cluster the number of household, the percentage (out of the total sample) and the contribution of each activity to the total income is reported.

Class	N	% of HHs	Crop production	Livestock	commercial (business, selling)	hunting, gathering, fishing	Remittance, allowance	Brewing, artisans	petty trade	salary	skilled wage	unskilled wage (agric)	unskilled wage (non agric)	other
1	4779	41.2	97%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	2%
2	2226	19.2	61%	35%	0%	0%	0%	0%	0%	2%	0%	0%	0%	1%
3	2288	19.7	54%	2%	0%	0%	0%	0%	3%	39%	0%	0%	0%	0%
4	215	1.9	16%	3%	0%	0%	0%	0%	0%	0%	1%	78%	1%	0%
5	499	4.3	50%	1%	1%	0%	0%	0%	0%	2%	44%	0%	1%	0%
6	423	3.6	51%	2%	45%	0%	0%	0%	0%	2%	0%	0%	0%	0%
7	80	0.7	46%	4%	0%	43%	0%	0%	0%	2%	2%	2%	0%	0%
8	436	3.8	57%	2%	0%	0%	0%	0%	0%	2%	0%	0%	39%	0%
9	23	0.2	45%	1%	0%	1%	0%	47%	0%	2%	0%	2%	0%	1%
10	416	3.6	47%	1%	1%	0%	44%	0%	1%	4%	1%	0%	0%	1%
11	227	2	10%	2%	0%	0%	0%	0%	0%	1%	0%	0%	0%	87%
Total	11612	100	71%	7%	2%	0%	2%	0%	1%	8%	2%	2%	2%	3%

ANNEX 5 : Map of surveyed area





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