

**An User's Guide to Data from Round 1.5 of the Pakistan Rural
Household Panel Survey**

Data Paper

December, 2014

**International Food Policy Research Institute (IFPRI)
Innovative Development Strategies (IDS)**

INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE

The International Food Policy Research Institute (IFPRI), established in 1975, provides evidence-based policy solutions to sustainably end hunger and malnutrition and reduce poverty. The Institute conducts research, communicates results, optimizes partnerships, and builds capacity to ensure sustainable food production, promote healthy food systems, improve markets and trade, transform agriculture, build resilience, and strengthen institutions and governance. Gender is considered in all of the Institute's work. IFPRI collaborates with partners around the world, including development implementers, public institutions, the private sector, and farmers' organizations, to ensure that local, national, regional, and global food policies are based on evidence. IFPRI is a member of the CGIAR Consortium.

INNOVATIVE DEVELOPMENT STRATEGIES

Established in 2002, Innovative Development Strategies (IDS) is a private sector consulting organization which carries out diagnostic and evaluative exercises. Its research and outreach is devoted to the identification and analysis of economic, social, cultural, political, business, and institutional problems connected most particularly to economic development and poverty alleviation. IDS services reflect the spectrum of support in all areas of economic development, poverty reduction, social sector to public sector reforms and governance, and from agriculture and rural development to industrial development and trade. In all these areas IDS offers support in conducting research, sector capacity building and development of Monitoring and Evaluation capability at all levels. IDS has vast experience in developing and delivering large and complex projects with a proven track record of success. IDS supports donors, NGOs, and government bodies working towards economic development and poverty reduction in Pakistan.

PREFERRED CITATION:

Data Paper

International Food Policy Research Institute (IFPRI); and Innovative Development Strategies (IDS). 2014. An User's Guide to Data from Round 1.5 of the Pakistan Rural Household Panel Survey (PRHPS) 2012. Washington DC; Islamabad, Pakistan: International Food Policy Research Institute (IFPRI); and Innovative Development Strategies (IDS)

Dataset

International Food Policy Research Institute (IFPRI); and Innovative Development Solutions (IDS). 2015. Pakistan Rural Household Panel Survey (PRHPS) 2012, Round 1.5. Washington, DC: International Food Policy Research Institute (IFPRI). <http://dx.doi.org/10.7910/DVN/T9GGYA>.

1. Introduction

Responding to a request from the Government of Pakistan, the Pakistan Strategy Support Program (PSSP) was launched in July 2011. This program is a flexible country-led and country-wide policy analysis and capacity strengthening program, which provides analytical support on a range of economic policies affecting agricultural growth and food security in the country. The core purpose of the program is to contribute to pro-poor economic growth and enhanced food security through strengthened national capacity for designing and implementing evidence-based policy reforms.

PSSP's four primary research priorities are as follows:

- a. Agricultural production and productivity
- b. Water management and irrigation
- c. Macroeconomics, markets and trade
- d. Poverty reduction (Income dynamics) and job creation (social safety nets)

Pakistan Rural Household Panel Survey (Round 1.5) 2012, a sub-sample consisting of agricultural households captured in Round 1 of the Panel Survey, gathers detailed information on agricultural production and related issues from rural households in Pakistan. Round 1.5 covers 942 agricultural households in 76 primary sampling units in the rural areas of three provinces namely: (i) Punjab; (ii) Sindh; and (iii) Khyber Pakhtunkhwa (KPK). This survey covers information of households, who either managed or cultivated agricultural plots, during the production year 2011-12, and two crop seasons¹, namely: (i) Kharif 2011; (ii) Rabi 2011-12. It gathers information on agricultural production (including inputs and outputs or crop and livestock production), agricultural water use, farm and household assets, access to extension services, climate change, credit, employment and income, household consumption and expenditures, and the linkage between pesticides and health. The sample is nationally representative of the rural areas of the three provinces. Data was collected at household, individual and crop level using a household level questionnaire.

2. Sampling Methodology

Round 1.5 focuses on only those households that were involved in agricultural production in the first round of the Rural Household Panel Survey (RHPS) 2012. The first round of the Rural Household Panel Survey (RHPS) was conducted in 76 villages in Punjab, Sindh and Khyber-Pakhtunkhwa (KPK) in March-April 2012. The sampling frame was based on the 1998 Census of Pakistan. Household and population data were available for 1998 at the national, provincial, district, tehsil, union council and mouza (revenue village) level. The population and number of households were projected to 2011 for each of these levels using district and tehsil-level population growth rates.

All enumeration blocks classified as urban in the 1998 Census were removed from the sampling frame, as this is a rural household survey. All enumeration blocks with projected population greater than 25,000 in 2011 were also considered urban and removed from the sampling frame. The sample excludes rural areas in Balochistan and the Federally Administered Tribal Areas because they were considered unsafe for the

¹ Pakistan has two crop seasons called Kharif and Rabi. Sowing for Kharif generally starts in April and harvesting begins in October. Sowing for the Rabi season starts in October and the crops are harvested during April.

enumeration. Additionally, 13 districts of KPK were excluded from the sampling frame due to safety concerns. The remaining 11 districts of KPK were part of the sampling frame.

The multistage stratified sampling technique was used to select the sample. We first used the proportion of rural households in each province to determine the number of districts that would be chosen from that province. A total of 19 districts were selected from within the three provinces; 12 from Punjab, 5 from Sindh and 2 from KPK. We then used Probability Proportionate to Size (PPS) to select districts from each province. PPS ensures that within a province, districts with more rural households have a greater probability of being selected in the sample.

For each province, the total number of households was calculated, and then the districts were arranged in a random order. The sampling interval was calculated by dividing the total number of households in the province by the number of districts that were chosen from the province. For example, for Punjab the sampling interval is $10,143,181 / 12 = 845,265$.

The next step was to generate a random start 'r', which was a random number between zero and the sampling interval. The cumulative number of households was calculated in each province across districts. The district that contained 'r' within the range of its cumulative number of households was selected. The district that contained the sampling interval plus 'r' within the range of its cumulative number of households was selected as the second district. The nth district selected contained the sampling interval plus n-1 multiplied by 'r'. The process was repeated until the required number of districts was chosen from within the province.

Within each district, 4 mouzas were chosen using an equal probability systematic selection. In other words, mouzas with smaller populations had the same probability of being selected as highly populated ones. Using PPS at this stage would have ensured that each household had same probability of being in sample. However, that would bias our sample towards more populous mouzas, and possibly ignore the smallest mouzas. Since our survey aims to understand the dynamics of different kinds of villages in rural Pakistan, it is imperative to include mouzas of different sizes.

The mouzas were arranged in a random order, and were assigned a serial number. The sampling interval was calculated by dividing the total mouzas in the district by 4 (the number of mouzas chosen from each district). A random start 'r' was generated, which was a random number between zero and the sampling interval. The mouza with the serial number 'r' was selected as the first mouza. The mouza with serial number sampling interval plus 'r' was selected as the second mouza. The third mouza had serial number sampling interval plus two 'r', while the fourth mouza had serial number sampling interval plus three 'r'.

For each mouza in the sample, the enumeration team conducted reconnaissance and created a map. All mouzas were divided into enumeration blocks. Each enumeration blocks were of the same size, containing 200 or fewer households. If there were fewer than 200 households in a mouza, the entire mouza was considered a single enumeration block. In each mouza, one enumeration block was randomly selected for enumeration.

A complete household listing was conducted of the enumeration block that was selected. Twenty-eight households were then randomly selected from this list using an equal probability systematic selection. The listing form gave every household a serial number. The sampling interval was calculated by dividing the total number of households in the enumeration block by 28 (the number of households chosen in each mouza). A random start 'r' was generated, which was a random number between zero and the sampling interval. The household with serial number 'r' was the first household selected for enumeration. The household with the serial number sampling interval plus 'r' was the next household selected for enumeration. The nth household selected for enumeration had a serial number of the sampling interval plus

n-1 multiplied by 'r'. The process was continued until 28 households were chosen in the mouza. Of these, households engaged in agricultural production were sampled for Round 1.5. There was no replacement for households that refused or were not available to participate in the survey.

Table 1: Pakistan Rural Household Panel Survey (Round 1.5) Sample

Province	Number of Districts	Number of Mouza per District	Number of Households per Mouza	Total Number of Agricultural Households in Province
Punjab	12	4	28	543
Sindh	5	4	28	317
KPK	2	4	28	120
Total	19	4	28	980

The 12 districts surveyed in Punjab are Kasur, Bhakkar, Khanewal, Attock, Vehari, Jhang, Dera Ghazi Khan, Bahawalnagar, Rahim Yaar Khan, Multan, Faisalabad and Sargodha. The 5 districts surveyed in Sindh are Thatta, Dadu, Sanghar, Jaccobabad and Hyderabad, while Mansehra and Nowshera were surveyed in KPK.

The sample selected for the survey is summarized in Table 1. Seven selected mouzas had to be replaced for various reasons. Two mouzas in Sanghar were replaced because a dam had been built on the mouza and households have been relocated. One mouza in Nowshera was replaced because it was in a military area. Two mouzas in Dera Ghazi Khan and two mouzas in Mansehra were replaced due to security concerns.

Though 980 households were sampled and contacted, information on 38 households could not been collected. There were 5 households in Punjab, 7 households in Sindh, and 3 households in KPK that were not available to participate in the survey. 3 households in Punjab refused to participate. 14 households in Punjab, and 1 household each in Sindh and KPK turned out to be agriculture wage workers, rather than agricultural households. 4 households in Sindh migrated, and could not be surveyed. As mentioned above, these households were not replaced. Overall, 521 households participated in the survey in Punjab, 305 in Sindh, and 116 in KPK. Thus, a total of 942 households were surveyed for detailed agricultural modules.

3. Overview of Analysis

The following is an overview of analysis completed using the RHPS Round 1.5 data. The household survey collected information on a large number of topics pertaining to agricultural production.

Most of the farmers are marginal farmers. Based on net cultivated land, farmers are divided into four groups based on net cultivated land, namely, marginal farmers (up to 5 acres), small-scale farmers (more than 5 and less than 12.5 acres), medium-scale farmers (more than 12.5 and less than 25 acres), and large-scale farmers (more than 25 acres). Most of the farmers (71.2 percent) in the three provinces are marginal farmers. Twenty-one percent of the farmers are small-scale farmers, 6.3 percent are medium-scale farmers, while only 1.6 percent are large-scale farmers. The percentage of marginal farmers (88.8 percent) is the highest in KPK, and the lowest in Punjab (64.3 percent).

Majority of the plots are owned. Out of 1,659 plots of the surveyed households during the production year of 2011-12, 56 percent of the plots are in Punjab, 27 percent are in Sindh, and 17 percent are in KPK. Most of the plots in our sample are owned (66%) and the second highest tenancy type is shared-in (just over 20 percent). 11 percent of the plots are rented-in, while only two percent are rented-out. A much smaller proportion of plots are shared-out (0.6 percent), and 0.2 percent are mortgaged but self-cultivated. Sindh

differs in comparison to Punjab and KPK with regards to tenancy status as shared-in plots constitute the majority (53%), rather than owner operated as is the case in Punjab and KPK.

Wheat is the predominant crop grown in the Rabi season. Wheat is the main crop in the Rabi season in all three provinces, however in the Kharif while cotton is the major crop in Punjab (taking up 45% of the land); rice takes up most of the cultivated area in Sindh. In KPK nearly 51% of the land in Kharif goes to the Maize crop, followed by a far off second in the form of sugarcane (13% of the land).

Also interesting to note is that while most of our sample prefers to grow just one crop for the entire season, farmers are more likely to grow multiple crops in the Rabi season as compared to the Kharif. (42 percent compared to 35 percent).

Production loss for cotton is high. For the Rabi 2011-12 and Kharif 2012 seasons for which data was recorded in our survey it appears that cotton with an average yield of 707 kg/acre suffered the most from pre and during harvest losses, estimated at 58% by the respondents. Wheat losses were estimated at 56 while sugarcane was estimated at 42 percent.

Sugarcane generates the most revenue per acre. Sugarcane yields the most revenue per acre, Pakistani Rupee (PKR) 87816, but it also has the longest growing season (nine months). Therefore, farmers growing sugarcane have limitations growing alternate crops during this time. This is followed by cotton which generates PKR 43879 per acre. Following these are maize which gives PKR 35502 per acre, rice (PKR 27949), and wheat (PKR 21541).

Use of chemical fertilizer is high. Almost all households utilize some kind of fertilizer or manure on their plots, however, there are no households utilizing compost. 90 percent of plots in the sample applied some form of chemical fertilizers. The most commonly applied fertilizer is Urea, probably due to subsidies in production, followed by DAP. Potash and micro-nutrients like zinc have a relatively small presence in the sample. Sindh has the highest rate of Urea and DAP application and Punjab has the lowest rate of Urea use in terms of kg/acre.

Majority of agricultural households produced livestock products. Although 96 percent of households produced livestock related commodities during our survey time frame, only 40% of these households sold these products. Amongst these transactions about 92% occur within the village and average at PKR 20000 per household. This is also reflected in data which shows that 43% of these transactions are directly to the customer themselves, 25 percent are with wholesalers and retailers respectively and just 7 percent are with private companies.

Canal water is the primary source of irrigation water. Canal water is the main source of water for the majority of the plots (57%) followed closely by groundwater which is the key water source for 40% of the plots. 64% of the plots utilize at least two sources of water while 16% utilize three sources to meet their water requirement. Sindh relies more heavily on canal water as compared to Punjab and KPK, where both groundwater and canal are primary water sources.

82 percent of farms in Punjab, 77 percent in Punjab and 60 percent in Punjab use flood irrigation method, and while furrow irrigation is also utilized, bed and furrow method rarely makes an appearance in our sample.

Households have low access to extension services. Only twenty-four percent of surveyed households indicate that they interacted with an extension agent during our survey time-frame. Majority of these

households are in Punjab with 27% of the households in Punjab reporting they had met and agent followed by 24% of the households in Sindh, with only 6% of the households in KPK reporting such interactions.

Most households received information on aspects related to crop production, while the households in Punjab reporting a relatively greater diversity in the information received, including information on agrochemicals, crop varieties and fertilizer.

4. Contributors and Acknowledgments

The collaborative partner in Pakistan was Innovative Development Strategies (IDS) in Islamabad, Pakistan. The funding for the survey came from the U.S. Agency for International Development (USAID). IDS served as the data collector and handled all of the survey logistics, from enumerator training to the processing of the completed questionnaires.

The survey was designed and supervised by International Food Policy Research Institute (IFPRI) and was administered by Innovative Development Strategies, Islamabad, Pakistan.

The questionnaires design team was led by Dr. Claudia Ringler of IFPRI and Dr. Hina Nazli of PSSP with substantial contribution by Ishfaq Muhammad of PSSP and Elizabeth Bryan of IFPRI. Thanks are also due to Arshad Khurshid and his team at IDS for their efforts in producing the dataset.

Gratitude is owed to the 39 enumerators who worked diligently in extremely difficult circumstances. Despite several security issues, they put out exemplary efforts to collect the data. Additionally, the 942 households who participated in this survey and provided their valuable time and useful information also deserve commendation.

This work would not have been possible without the guidance and support provided by Dr. Sohail Jehangir Malik, Chairman of IDS, and Dr. Paul Dorosh, Director of the Development Strategy and Governance Division at IFPRI. Their invaluable input and advice at each stage of this process, from survey design to the production of these discussion papers, is gratefully acknowledged.

Additionally, the following individuals contributed to the production of the dataset: Dr. David Spielman, Madeeha Hameed, Hamza Syed Haider, Dawit Mekonnen, and Edward Whitney of IFPRI; and Asjad Tariq, Hassan Shafiq, Saqib Shahzad, Amina Mehmood, Asma Shahzad, Nishat Malik, Arshad Khurshid, Azhar Amir, Amjad Iqbal, Danish Javaid Satti, Muhammad Awais, Anees Majeed, Mubashir Ijaz, Muhammad Imran, Zahid Masood, Munazza Saboochi, and Beenish Jabeen of IDS. The support provided by the PSSP team members—Saira Malik, Sheheryar Rashid, Wajiha Saeed, Faryal Ahmed and Hira Channa—is

gratefully acknowledged. Further gratitude is owed to Col. Imran Afzal Malik and his team, including Tahir Ahmad, Haji Afsar Khan, Afzaal Ahmed, and Asjad Iqbal, for providing logistic and administrative support.

Finally, the United States Agency for International Development (USAID) is recognized for their generous funding, without which this survey would not have been possible.

5. Disclaimer

The International Food Policy Research Institute (IFPRI) requests that users of the data acknowledge the source of the Pakistan Rural Household Panel Survey 2012 dataset in all publications, conference papers, and manuscripts, as described under preferred citation.

IFPRI adheres to the principle of unrestricted public access to its own final research outputs and will make such outputs freely available. The Institute encourages the use of the Pakistan Rural Household Panel Survey 2012 dataset; for detailed information on its use, please refer to IFPRI's Intellectual Property Policy. The data files in this dataset are unit record or 'raw' data files. Information that would allow survey respondents to be identified has been deleted from the files, but all other information remains. IFPRI's decision not to alter the contents of the data files means that the user of these files will need to take care in handling missing observations, outliers, and violations of logical consistency.

The data are provided 'as is' and in no event shall IFPRI be liable for any damages resulting from use of the data. While great effort was taken to obtain high-quality data, the accuracy or reliability of the data is not guaranteed or warranted in any way.

**INTERNATIONAL FOOD POLICY
RESEARCH INSTITUTE**

www.ifpri.org

IFPRI HEADQUARTERS

2033 K Street, NW
Washington, DC 20006-1002 USA
Tel.: +1-202-862-5600
Fax: +1-202-467-4439
Email: ifpri@cgiar.org