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Enhancing Agriculture Services through Digital Farmer Database in Pakistan—Can BISP’s NSER serve the purpose?

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Enhancing Targeted Agriculture Subsidies in Pakistan: Exploring Database Options

1. Summary

1. After the devastating floods of 2022, followed by economic downturn and signing of the International Monetary Fund (IMF) Stand-By Arrangement in July 2023, the Government of Pakistan has decided to shift from an untargeted to a targeted agriculture subsidy mechanism across the country. Achieving this goal requires a purpose-built database with details that confirm a farmer’s eligibility to qualify for subsidies—details such as information on farmers’ land area, crop types, contact numbers, and unique identification numbers. The Punjab is the only province that has such a database and a subsidy disbursement mechanism in place. In the absence of such a database in other provinces, the government is exploring the use of the National Social Economic Registry (NSER) database for electronic subsidy disbursement to farmers in all provinces. The federal government’s NSER database is designed to target support to poor households in national-level social protection programs. The NSER database primarily collects information at the household level (including multiple adults living and eating together) rather than at the individual level and therefore may exclude unique information about a significant number of farmers living within the same household. Therefore, to help the government accurately identify the right beneficiaries, improve disaster preparedness and response, and strengthen targeted subsidy mechanisms, the Asian Development Bank is actively supporting the provincial governments of Balochistan and Khyber Pakhtunkhwa to initiate registration of farmers for the establishment of a dedicated digital database that can be a rich data source for years to come.

2. Pakistan is home to 8.2 million farming households, which not only provide food to the country’s fast-growing population but also contribute to 23% of the national gross domestic product. Agriculture in Pakistan is a low-yield, low-profit sector, and its farmers often need financial support from the state. The Government of Pakistan provides a range of support instruments including subsidies on inputs, machinery, and electricity; interest-free loans; and buy-back guarantees to farmers. Subsidies are provided to farmers in a direct and indirect manner, including subsidies on inputs, on-farm machinery and implements, solar tube wells, electricity tariffs, and minimum support price as well as subsidies to fertilizer manufacturers, aiming to curtail retail prices. Most subsidies are untargeted and also benefit large landholders, thus reducing the fiscal space for targeting support to smallholder farmers. With the government constantly facing financial constraints as a result of poor economic growth, depleting foreign exchange reserves, and high inflation, it is not feasible to maintain untargeted subsidies for all farmers.

3. In June 2023, the Government of Pakistan and the International Monetary Fund reached a stand-by arrangement on policies to stabilize the economy through improved fiscal discipline, revenue mobilization, and expenditure control. The government is therefore obliged to undertake serious governance and subsidy reforms to reduce fiscal costs while protecting the most vulnerable people. One of the first policy options that the government has considered is to shift toward targeted subsidies in agriculture. This decision aims to direct resources to those in greatest need, enhancing both cost efficiency and the well-being of smallholder farmers.

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4. In order to offer targeted subsidies in agriculture, it is essential to establish a unified database of farmers that includes critical information on each farmer’s contacts, location, landholding, area sown under different crops cultivated, source of irrigation water, and ownership of livestock and machinery. Such a database will help in providing targeted agricultural subsidies and can enable the government to deliver extension services through digital means; facilitate precision farming; use traceability and blockchain technology to track the commodity trading; offer climate services; serve as an early warning system for weather, pest, and disease risks; disseminate pricing information; establish linkages with markets; and enhance revenue generation through tax collection.

5. The need for developing a farmer database became more evident after the floods of 2022 that affected 33 million people across Pakistan. In order to ensure food security of the affected population and to improve farmers’ livelihoods, the Government of Pakistan, along with development partners, initiated distribution of free seed and fertilizers aiming to support flood-affected farmers. The lack of a farmer database required the preparation of manual lists of farmers, assessment of their landownership arrangements, and estimation of their damages (Box 1). Because this was a time-consuming effort, it led to delays in recovering farmers’ livelihoods. A comparable challenge had been faced in the floods of 2010 that affected 18 million people and damaged 2.51 million hectares (6.2 million acres) of crops. A post-disaster assessment report by the United Nations Development Programme (UNDP) underscored the difficulties faced in identifying and verifying flood-affected farmers. An accessible, unified digital database of farmers would play a significant role in rapid identification of the most vulnerable farmers and help to streamline efficient disaster and resource management. During the delays in response and post-flood recovery efforts and evident lack of disaster preparedness, it was expected that the government, together with development partners, would invest in creating a farmer database to register all farmers and digitize their records. However, no such initiative materialized until 2016, when the Government of the Punjab initiated an electronic subsidy scheme for farmers. The scheme required an extensive registration, verification, and digitization process for effectively targeting the disbursement of subsidies to farmers. Unfortunately, this effort was not replicated by other provincial governments.

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5 UNDP. 2013. Lessons learned from the 2010 Early Recovery and Restoration of Flood Affected Communities in Pakistan. Islamabad.
Box 1: Lessons from Balochistan’s Farmer Registration Activity

As part of the livelihood recovery initiative following the 2022 floods in Pakistan, which impacted 33 million people, a project of the Government of Balochistan involved manual data collection of over 60,000 farmers in the Nasirabad Division of the province of Balochistan. The project was funded by a Japan Fund for Poverty Reduction grant and managed by the Asian Development Bank. The objective of data collection was to identify unique smallholder beneficiaries owning less than 6.5 hectares (16 acres) of land who could qualify for targeted support in the form of seed and fertilizer provision. The data were complemented by land records information to verify results. The farmer registration and digitization effort yielded additional benefits that included:

(i) assessment of social, physical, and economic vulnerabilities of households through data collection on demographic, social, and technical variables: the information was used to evaluate the eligibility to receive support packages;
(ii) identification of the most eligible farmers who had been impacted by the floods, were experiencing severe food insecurity, and had not received any prior assistance: this effectively prevented duplication of aid;
(iii) categorization of farmers based on farming systems (irrigated, nonirrigated, primary crops) to ensure that the selected farmers were cultivating rice in alignment with the assistance packages designed for the ongoing cropping season;
(iv) creation of a valuable database for the government to help design targeted farmer support programs and policies: by utilizing the existing data, government departments would easily identify eligible beneficiaries for specific projects and targeted support schemes; and
(v) establishment of market linkages by enabling buyers to determine types and volumes of crops grown in specific regions for better purchasing planning; and provision of farmer data that input providers and agriculture service providers could leverage for initiating or expanding business operations, improving advisory services, and offering tailored products.

Because the activity of listing Balochistan farmers was directly linked and implemented as a tool for disbursing input provision to farmers, it faced the primary challenge of elite capture and nepotism. Other issues included duplication of the Computerized National Identity Card (CNIC), lack of land records in some areas, political influence, and poor capacity of data collection staff. These challenges highlighted the importance of separating farmer registration activities with direct financial or input distribution to ensure equitable and fair distribution of resources. Furthermore, the activity served as a key lesson on how to enhance disaster preparedness, enable targeted subsidies, and promote data-driven agricultural development.

Source: Authors based on interviews with the Government of Balochistan, Food and Agriculture Organization (FAO) of the United Nations, and Asian Development Bank teams involved in farmers registration.
2. Use of Farmer Databases for Targeted Agriculture Subsidies in Other Countries

6. The use of digital farmer databases for targeted subsidy disbursement programs has been a significant step in agricultural development. Such databases integrate various datasets, enable targeted interventions, and ensure transparency in disbursing subsidies and tailoring advisory services. Successful examples from across the world including Europe and North America show such databases have a direct impact on helping to ensure food security and enhance productivity, sustainability, and livelihoods in the agriculture sector. Bangladesh, Kenya, Nigeria, and the Philippines have also launched digital platforms that capture vital information about farmers, farming practices, and land details to ensure efficient and transparent disbursement of agriculture subsidies and advisory services.

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3. Farmer Databases in Pakistan

7. Currently, Pakistan has four levels of farmer databases across the provinces: (i) manual, paper-based, unverified databases; (ii) manual, verified databases; (iii) digital unverified databases; and (iv) digital verified databases. While farmer databases are owned by the provincial agricultural departments, specific aspects of farmer details, such as verifying identification cards and validating landownership records are managed by other government entities such as the provincial revenue departments and the National Database and Registration Authority (NADRA). This exchange of information requires extensive inter- and intra-integration of databases within government agencies. Among the provinces, only the Punjab has made significant advancement by digitally registering over 73% (approximately 4 million) of its farmers, the majority of which are verified by the revenue department. Khyber Pakhtunkhwa lags far behind, with only 25% of farmers registered with the Agriculture Department. Their data are fragmented, stored in multiple nonunified databases, and lack verification by the revenue department. Balochistan and Sindh are at a similar level, lacking unified farmer databases or data verified by the revenue departments.

8. Traditionally in Pakistan, providing farmers with agriculture inputs subsidies has relied on manual, paper-based processes that are labor-intensive, time-consuming, and prone to error. However, the Punjab, as the only province with a unified digital farmer database, has introduced electronic methods for subsidy provision in the decade prior to 2023. The Punjab initiated the “E-Voucher” system that is integrated with banks for digital payment systems. The system involves the use of a network of input providers, branchless banking, and mobile-wallet operators who disburse payments to qualified and verified farmers. Such a system streamlines the subsidy disbursement process by reducing leakages, enhancing transparency, and improving the efficiency of targeted subsidy provision.

9. The process of developing an extensive farmer database involves challenges. The first step is to register farmers, either through a website, mobile phone application, call center, or physical visits by agriculture officers to the farmers. Although self-registration is often the low-cost option, farmers usually lack the motivation to sign up themselves, especially if illiteracy is a constraint. Therefore, to effectively reach the farmers, agriculture officers need to interact directly with them. For this, each officer needs to be provided with a vehicle and electronic tablet for data entry, all of which incurs a cost. The data then need to be securely stored in a government-owned server and to be linked to other government databases for verification procedures. A safe, fast, and large data server and backup is required that shares data instantly with input providers or branchless banking operators providing subsidized inputs or cash to farmers. Therefore, the government needs to allocate the required resources and create partnerships within the inter- and intra-government departments and the private sector in order to successfully establish and run an effective digitized farmer database (Box 2).
4. Can Pakistan Use the National Social Economic Registry to Offer Targeted Agriculture Subsidies?

10. In the aftermath of the 2022 floods, policymakers in Pakistan have been deliberating whether to use the NSER database to offer targeted agriculture subsidies to farmers in provinces that do not have a unified database. The NSER is a national database of urban and rural households maintained under the Benazir Income Support Programme (BISP). The BISP is a national safety-net institution established by the Government of Pakistan in 2008 with the objective to alleviate poverty. The BISP operates multiple programs to provide targeted cash transfers to the poorest women and their families across Pakistan. In 2011, the BISP initiated the NSER to collect socioeconomic and income data from 27 million households.  

11. The data for the NSER were collected by surveyors who physically visited households to verify information. The data were then used to create a household poverty scorecard, a critical requirement...
to determine the eligibility of potential beneficiaries. For many years, the NSER operated as a static registry, which meant that the registration process ceased after the initial roll out surveys were conducted. However, from 2019 to 2021, a new data collection activity was carried out with the intention to update the database. The NSER was then converted into a dynamic registry to regularly add new applicants, re-evaluate current beneficiaries, and rectify inclusion and exclusion inaccuracies. As of 2023, the NSER allows open and continuous access to registration through the Benazir Registration Desks, set up at the tehsil level across the country.\(^9\) The BISP has a database of 35 million households based on 24 socioeconomic indicators (through 79 questions) in the NSER questionnaire, including information on employment type, agriculture land, and livestock ownership.\(^10\)

12. To evaluate the applicability of the NSER data for targeted farmer subsidies, it is important to understand the design and characteristics of its survey, identify gaps, and compare variables against the dedicated farmer questionnaires developed by the governments of Khyber Pakhtunkhwa and the Punjab.

13. The NSER questionnaire is designed to identify household poverty levels through a poverty scorecard. The scorecard helps identify the eligibility for support programs aimed at improving livelihoods. In many rural households, multiple family members are involved in livestock-rearing and agriculture on a self-cultivation, sharecropping, or contract basis. The main limitation of the NSER is that it does not capture information of the individual farmer within a household. Critical details such as the farmer’s name, Computerized National Identity Card number, and contact information are required for any targeted subsidy schemes. In reality, a household may have multiple farmers eligible for agriculture- and/or livestock-related subsidies. Therefore, each farmer should be recorded as an individual, rather than aggregating them at a household level to ensure accurate disbursement to eligible recipients.

14. Similarly, the NSER gathers data on the total landholding of the household. This information overlooks individuals operating as farmers under distinct cropping arrangements and thus can lead to a situation where the cumulative land size exceeds the threshold for a smallholder farmer classification. For example, if four siblings farm 2-hectar (5-acre) plots each, the total accumulates to 8 hectares (20 acres), exceeding the threshold for smallholder farmer classification (5 hectares or 12.5 acres or less). Therefore, landholding information at the individual level is essential to ensure equitable distribution of resources and targeted support.

15. In addition, the NSER information on landholding is not disaggregated by characteristics or land type, such as cultivated, fallow, or wasteland areas. This information is also essential to understand the ability of the farmer to produce crops and generate a certain income. Also, the NSER only records details about cultivation contract type in binary information (Yes or No). Such data do not include the quantity of hectares allocated to self-cultivation, tenancy, sharecropping, or contract farming. Targeted subsidy programs aim to assist farmers on the basis of the size of land cultivated, rather than differentiating between landownership and sharecropping, as the primary objective is of increasing production and ensuring food security. Therefore, information regarding the area under various contract types is necessary to estimate the farmers’ input requirements. Furthermore, the NSER dataset excludes information about farmers engaged in fruit cultivation, thereby overlooking a substantial segment of farmers across Pakistan.

16. A cellphone contact number is necessary for disbursement through an electronic subsidy scheme to individual farmers. In the Punjab, digital subsidies are provided through registered

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\(^9\) The tehsil is a local administrative unit.

cellphone numbers linked to electronic wallets, which require individual biometric verification to ensure that the correct farmer receives the support. Therefore, it is essential to obtain farmers’ contact information to ensure accurate targeting and quick disbursement of subsidies. Having individual farmers’ data enables direct electronic payments to farmers’ accounts or digital wallets, a method not applicable via household-based contact information. Verification of farmer information, tracking, and utilization of payments can all be carried out through cellphone data.

17. To tailor extension and advisory services that farmers need requires information about their education levels. Such information helps identify approaches appropriate for communicating advisory messages. For example, a farmer with more years of formal education and access to a phone may benefit from digital and technical advisory, but a farmer unable to read or write may require a more visual demonstration of farming advisory information. The NSER survey does not gather information about the education background of the farmers. Incorporating this information for future farmer support programs may help improve the design of digital extension and advisory services, e-voucher schemes, and mobile literacy programs. Based on the education level information, programs to enhance skills and improve documentation to access formal credit can also be customized for farmers. Such interventions may benefit farmers by providing resources to empower them, with the goal of improving livelihoods.

18. One of the key shortcomings of the NSER data is that it does not validate the information pertaining to landownership and contract arrangements. Validation of this information requires presenting a land document (fard, e.g., lease contract), which is critical to estimating the size of land owned and contract type required for targeted subsidy schemes. However, the NSER does not require submission of the land documents or verify data with the Land Revenue and the Agriculture Departments. Verification and regular updating of land documents improves data accuracy, allocation of resources, and transparency in subsidy mechanisms. Such information is also useful for countries planning to introduce land reforms to increase agriculture productivity and promote rural development.

19. Farmer registration by provincial agriculture departments creates “ownership” of the departments and ensures that their own data are used for agriculture-related activities. Farmer registration and data collection is done by the field staffs of extension directorates of agriculture departments who have the expertise for gathering the type of data required by the department. The presence of permanent agriculture field staff throughout the provinces not only helps to ensure the accurate collection and verification of the farmers’ data but also provides a mechanism to update the data. Field staff can have direct contact with farmers and are able to verify farmer information directly.

20. The questionnaires formulated and currently being used for to create dedicated farmer database in select provinces of Pakistan have been carefully designed to ensure inclusion of detailed, individual-level information about farmers. The questionnaires were developed primarily to facilitate policymaking and implementation of targeted subsidy programs for farmers alone, which is more suitable than the NSER database that captures information at a broader level for a different set of beneficiaries and objectives. It is critical to recognize that the limitations of the NSER database make it an unsuitable tool for providing targeted subsidies to farmers in Pakistan.

5. Potential Solutions

21. Establishing a unified farmer database serves the crucial purpose of identifying beneficiaries eligible for agricultural subsidies, reducing government expenditure, and providing a range of policy choices for targeted interventions pertaining to agriculture and rural development. Considering the specific data requirements and international best practices, Balochistan, Khyber Pakhtunkhwa, and Sindh should consider giving a high priority to developing a dedicated, digital, unified farmer database.
that can be utilized for multiple subsidy schemes, bringing efficiency in agriculture initiatives and improving disaster management. Driven by the International Monetary Fund (IMF) Stand-By Agreement and building on the lessons learned from the 2022 floods and in line with the Resilient Recovery, Rehabilitation, and Reconstruction Framework (4RF) strategy, the Government of Pakistan has directed the three provinces to create a digitized farmer database on the lines of the Punjab model.

22. As the provinces initiate the process to establish their databases, they may follow some guiding principles that can enhance the effectiveness and applicability of the databases to the overall objective. Provincial farmer databases should be owned and maintained by their agriculture departments with support by the information technology boards, where required. Processes defining the collection and use of data should be established in line with project needs. The provinces may also consider legislation to ensure roles and responsibilities are defined and implemented in a sustainable manner, while safeguarding data integrity and security. Departments should also consider developing a mechanism to regularly update the database to reduce inclusion and exclusion errors. To encourage farmers to register, a communications campaign linking signing up to financial support may also be initiated. Similar to successful farmer database models in other countries, the provincial database initiatives will, when combined, help create a holistic national farmer database that will improve policymaking at the federal level and facilitate and improve the efficient distribution and use of targeted allocations of government resources.

6. Conclusion

23. To transform the agricultural landscape of Pakistan, enable data-driven decision making, and improve long-term fiscal sustainability, the best tool available today is a unified farmer digital database. Establishing such a database will help to accurately identify beneficiaries, map their required support through information on landholding and cultivated crops, and quickly disburse subsidies through mobile banking platforms. Such an intervention will not only improve the efficiency of disbursement operations but will also enhance financial inclusion and widen mobile phone penetration among farmers and encourage entrepreneurship. When male farmers experience the direct benefits of farmer registration, female farmers may be incentivized to independently register themselves, hence improving women’s access to credit, technology, and government support. A unified, digital farmer database is thus the obvious next step toward achieving economic sustainability in Pakistan’s agriculture sector.