ANALYZING THE EFFECTIVENESS OF SUBSIDY LOAN PROGRAMS TO BOOST AGRICULTURAL PRODUCTIVITY

A study conducted as a part of the Daayitwa Nepal Public Policy Fellowship 2022, together with the National Planning Commission

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ABSTRACT

Nepalese agriculture has been facing a long-lasting problem of low productivity threatening the food security of the country. The government of Nepal has been introducing different interventions to uplift the vary sector, including subsidy loan program to increase investment and improve the agricultural sector. Nevertheless, there is a dearth of evidence-based research on the impact and effectiveness of subsidy loan program. In this research, we employ the propensity score matching procedure to estimate the impact of the subsidy loan program on farm productivity in Dhunibeshi Municipality. The result indicates a significant average rise in the farm productivity of the participants of the program, ranging from 3872 kg/ropani/year to 3896 kg/ropani/year. Despite the positive and significant effect of subsidy loan program on farm productivity at the ground level, the national data showed no significant outcome of the program on national agricultural productivity, which is mainly due to poor outreach of the program among small farmers in rural areas of Nepal and its misuse by affluent businessmen in city areas, unfriendly policy provisions, procurement bank complexities and poor monitoring and supervision of the program from stakeholders. The subsidy loan program can be efficient, effective and relevant to the targeted group with amendments of policy hurdles, program implementation and institutional reforms.

Keywords: subsidy loan program, productivity, policy, beneficiaries, non-beneficiaries,

1. INTRODUCTION

1.1 Background

Agriculture has been a prioritized sector in the national economy in developing countries (Mogues, Yu, Fan, & McBride, 2012) which plays an important role in virtually all social and economic activities of any country (Cervantes-Godoy & Dewbre, 2010). Agriculture is the backbone of the Nepalese economy providing 60.4% of employment, and having 23.9% national Gross Domestic Product (GDP) (MOF, 2022). Agriculture integrated with livestock rearing is the major source of livelihood for a greater proportion of Nepalese people in rural areas. However, Nepalese farming is predominantly subsistence type run by small farmers that constitute the majority of the country's poor population (Joshi, Maharjan, & Piya, 2010) with low productivity.

Low agriculture productivity has been a long-lasting problem that aggravates food insecurity in Nepal. There are several factors contributing to low agriculture productivity in Nepal. The current generation is indifferent to this profession which is perceived as unprofitable. The agriculture sector has been competing for demand in labor with an off-farm source of income. Furthermore, agriculture is feminizing in Nepal as youths, especially men, seek jobs in cities and abroad (ILO, 2019). The shortage of agricultural workers has led to inadequate land management and underutilization of cultivable land (Ojha et al., 2017). Likewise, the average land holdings have declined from 1.11 hectares in 1961/62 to 0.68 hectares in 2011/12 (Joshi & Piya, 2021). The inheritance law of dividing land equally among progenies is decreasing landholding gradually (Dhakal & Khanal, 2018) resulting in shrinking farm size, scattered farmlands, and fragmented landholdings. The condition is further exacerbated by the increasing trend of land abandonment, particularly in hill agro ecological regions threatening food security and agricultural development (Subedi, Kristiansen, Cacho, & Ojha, 2021). Furthermore, a low level of improved agricultural technology adoption and climate change in Nepal has resulted in the over-exploitation of natural and land resources making the production system unsustainable and non-lucrative. Given the such farming context, policy makers are undertaking extensive discussion and dialogue in forming, implementing and evaluating policies concerning agriculture sector, for instances, increased use of modern techniques of production, availability of modern and efficient irrigation system, use of

improved seeds, availability of fertilizer and easy access to agricultural credit to improve agriculture productivity in Nepal.

Credit is pivotal for agricultural development in developing countries like Nepal. Access to credit can be one of the promising instruments to increase agriculture productivity. The farmers can step into agri-commercialization, agri-mechanization, start new agri-business, expand existing firms, adopt improved and innovative production technology, undertake climate change resilient agricultural practices, and procure farm input timely and adequately with accessibility to credit-consequently enhance farm productivity, and boost farm income and better living standards. In Nepal, there are formal, semi-formal, and informal sources of credit. Formal sources include banks like commercial banks and development banks; finance companies; microfinance development banks; microfinance NGOs, and saving and credit cooperatives operational in Nepal. Semi-formal sources of credit include unlicensed microfinance NGOs and saving and credit cooperatives. Further, informal financial service providers such as self-help groups, money lenders, traders, friends, families and relatives are prevailing, especially in rural areas. The farmers may seek credit from these different sources to meet their farm needs and improve their farming practices.

1.2 Problem Statement and justification of the study

The banks and financial institutes (BFIs) are increasing in Nepal with improving branch networks and client outreach. However, banks and finance companies mostly serve cooperates and individuals in urban areas while microfinance, semiformal finance institutes, and informal sectors provide services to poor and low-income rural households, at exorbitant interest. About 80% of loan needs come from an informal source and only 20% is covered by the formal sector in the remote parts of Nepal (Besley, et al., 2001). The agricultural credit in Nepal has increased at a depressed rate of 47 fold as compared to the total credit of commercial banks 184 fold from FY 1982/83 to FY 2012/13 (Shrestha, 2014). Furthermore, small farmers are less likely to access credit due to several reasons including lack of adequate business plans, complex loan procurement process, collateral issues, large eligibility criteria (Pradhan et al., 2019), and internal factors of farmers like types of agricultural commodities produced, purchases of operating inputs such as seeds and fertilizers, and fixed inputs such as machinery and equipment; the interest rate, and the repayment schedule (Gupta et al., 2016). Given such context, the Nepal government introduced the scheme of subsidy on interest rate in agricultural credit in 2014/15 and the subsidy rate was

revised after two years raising from 4 percent to 5 percent to ensure farmers' access to capital, improve investment opportunity and increase production. The program was aimed to inspire youths to engage in agriculture and provide access to loans for small-scale farmers. Additionally, Nepal Rastra Bank adopted the Priority Sector Lending Program (PSLP) in 2017, mandating formal institutions like banks and finance to allocate 10% of their loan portfolio to the agricultural sector at a subsidized interest rate of 5%, acknowledging the need to invest in the agriculture sector. Up to April 2022, the number of borrowers of subsidized agriculture loans has reached 59,931.

The government of Nepal has made efforts to mobilize the financial resources to the productive sectors like agriculture and the deprived sector like marginalized farmers. Regardless of the interventions made by the government in the sector, Nepalese agriculture has not progressed much. Agriculture imports have increased six folds in the last decade from NRs. 44.4 billion (USD 0.38 billion) to NRs. 250 billion (USD 2.1 billion) in the 2020s. Nepal imported cereals worth NRs. 64.7 billion (USD 523.6 million) and vegetables worth NRs. 31.5 billion (USD 254.7 million) only in the first ten months of the fiscal year 2078/79. The data showed a negative trade balance for the first ten months of the fiscal year 2078/79 despite several interventions of government in the very sector. The beneficiaries of the subsidized loans remain low. Therefore, it has necessitated exploring the problems associated with the agricultural subsidy loan disbursed by commercial banks and other banks and financial institutions and the resultant impact on the lives of Nepalese farmers and farm productivity. There are few works of literature on credit flow and its impact on farm production but no literature on the effectiveness of government subsidy loan programs on agriculture productivity. This study may provide a platform upon which the policy makers can reside to exploit the potentialities of the subsidy loan program to strengthen the export, assist the industrial sector and accelerate overall economic growth with a higher level of technical and allocative efficiency. Moreover, the findings of the study may be equally helpful to evaluate the factors that are creating obstacles to expanding subsidized credit to the agriculture sector and focus on some of the policy issues that can boost such credit. It will also be beneficial to NRB policy makers too for devising the appropriate policy tools and actions to achieve the goals of the subsidy loan program.

1.3 Objectives

The specific objectives of this study are:

- To analyze the structure and trend of agricultural subsidy loans during recent years.
- To explore the problems related to the procurement and use of agricultural subsidy loans.
- To examine the determinants that play a decisive role in agricultural subsidy loan lending decisions.
- To assess the impact of agricultural subsidy loans on farm productivity.

1.4 Research Questions

To address the objectives of the study in following research questions are set below:

1. What is the proportion of credit flow from commercial banks to the agriculture sectors and the difference in a scenario before and after the implementation of the subsidy loan program?
2. What are the constraints faced by stakeholders in the course of implementation of this program which includes the Nepal Government, Nepal Rastra Banks, Facilitators (Banks), and Beneficiaries (Farmers/loan-users)?
3. To what extent, the subsidy loan program has addressed financing issues in the agriculture sectors, and what class of farmers is benefiting from such a program?
4. Has the program contributed to increasing farm performance and the livelihood of farmers?

1.5. Limitations of the study

The scope and limitations of this study are defined below:

i. To fulfill the objectives and research question of this study, the selection of the study area is one of the crucial factors to accomplish the mission of this study. For this purpose, given the time and budget constraints, Dhunibeshi Municipality was purposively selected.

ii. This study is conducted with limited scope and geographical coverage with a purposively chosen sample and groups with specific objectives therefore findings and recommendations cannot be generalized but similar studies can be replicated.

2. LITERATURE REVIEW

2.1 Government policy on agriculture loan subsidy in Nepal (overview and economic significance)

Agriculture is the biggest sector of Nepal with more than 60.4% of households being engaged in farming, providing 64.54% of employment, and contributing 27.7% to the national Gross Domestic Product (MOF, 2020). However, the agriculture sector is predominantly run by small farmers and suffers from low productivity. The government has made several provisions prioritizing commercial agriculture and livestock sectors to improve the sector's productivity, to create employment opportunities within the country for unemployed educated youths, to utilize the skill and business efficacy of youth returned from foreign employment, and to make them self-employed within the country. The major form of government intervention to improve investment in agriculture is a subsidized agriculture loan where the borrower only pays a part of the commercial interest rate and the remainder is paid by the government.

The scheme of subsidy on the interest rate on agricultural credit was introduced by the Nepal government in 2014/15 and the subsidy rate was revised after two years raising from 4 percent to 5 percent. The provision of a loan of up to NRs. 70 million to every borrower at an interest rate of base rate+2% but not exceeding 10% was made. To support government objectives, Nepal Rastra Bank (NRB) periodically issues a monetary policy based on budget and fiscal year policy. As per the procedure, the bank and financial institutes (BFIs) should sanction loans to agriculture and livestock sector-targeted clients intending to provide interest subsidies to the borrowers from the government through NRB.

The NRB has directed the commercial banks to disburse 12% of their total credit to the agriculture sector by mid of July 2022 and up to the mid of April 2022, 12.28% of total credit (NRs. 490 billion 150 million) has been disbursed to 59,931 borrowers. The sources of subsidy loan burrowed and the number of borrows by Oct, 2022 are given below along with the approved limit and outstanding amount.

Table 1. Beneficiaries of subsidy loan program

BFIS	No. of burrower	Approved limit (in '000 NRs.)	Outstanding amount (in '000 NRs.)

A	54,490	148,372,686	126,186,070
B	5,264	13,395,866	11,735,783
C	513	1,841,863	1,723,897
D	35	33,840	26,094
Total	60,302	163,644,254	139,671,844

Source: NRB

2.2 Impact of access to credit on agriculture productivity

Access to credit endorses investment opportunities for farmers on improved technology, innovation, mechanization, and climate-smart agricultural practices henceforth improving farm production. Agriculture credit plays a vital role in the commercialization of agriculture that props farmers to commence a new business, expansion of existing business, improve production efficiency, meet the capital need of farms (Jaen, 1966), adopt improved technologies, and subsist with shocks in the external economic environment (Musembi, 2019). The poor farmer can obtain new machinery, improved seed fertilizers, and other necessary inputs needed to expand the scale of production ((Akwaa-Sekyi, 2013; Saboor, Hussain, & Munir, 2009) through credit. Access to credit enables smallholder farmers to obtain much-needed storage facilities (Yu, 2008) and presents rural households with the opportunity to improve their social well-being, particularly in the area of health and education (C. J. Miller & Ladman, 1983). The provision of agriculture credit also allures those who feel constrained to start agribusiness due lack of necessary funds (Upadhyay et al., 2020). Ahma, Djurfeldt, Aryeetey, and Isinika (2010) contend that credit accessibility empowers impoverished rural farmers to wander into a new sector of economic activities, widen their sources of capital and manage risks that are bound to occur. Credit constraints increase the propensity of farmers towards less efficient traditional production methods, rain-fed subsistence farming, and present hurdles to procuring fertilizers and improved seeds during plantation time. Rimal (2014) concluded that lower labor productivity in the agriculture sector along with associated factor-like traditional methods of farming, poor irrigation facilities, and low use of modern farm technology was mainly due to low credit availability. Therefore, the agriculture credit

enhances farm productivity and thus boosting income and bettering living standards (Jan & Khan, 2012) of the farmers.

Access to rural credit has the potency to level-up the national income distribution of the country (M. H. Miller, 1977). It is due to the notion that a large proportion of the people in the country are involved in the agriculture sector and thus if farmers can secure such financial support then it may improve their economic contributions to the country. Access to credit could raise the income status of low-income rural households during off-farming seasons or after a poor harvest. Furthermore, in circumstances of income disparities between smallholder farmers and large holder farmers, credit may be used as an instrument to bridge such a poverty-widening gap (Owusu, 2017).

2.3 Empirical Studies on effects of Credit on Agricultural Productivity

Agriculture credit has an enormous impact on the lives of farmers and consequently on the economy of a country with a large proportion of the population engaged in the very sector. The relation between access to credit and agricultural productivity has been studied by several researchers, for instance, Farrell (1957), Aigner, Lovell, and Schmidt (1977), Carter (1989), Zuberi (1990), Meyer (1990), Feder, Lau, Lin, and Luo (1990), Coelli, Rao, O'Donnell, and Battese (1998) and Konare (2001).

Duy (2012) analyzed the impact of agricultural credit on farm productivity using the quintile regression and Stochastic Frontier Analysis techniques and responses from 654 farmers sampled from Mekong Delta region of Pakistan. He concluded that the rice yield and technical efficiency of farmers increased considerably because of access to credit, the educational levels of farmers and the high level of technology. His study also demonstrated that rice production was positively affected by the use of formal credit rather than informal credit.

Devi (2012) in her study of the impact of the cooperative loan on the agriculture sector found that agricultural credit assisted to increase productivity and developed the process of cultivation as a whole in Andhra Pradesh, India. She asserted that there was a significant increase in the usage of modern seeds, modernized inputs, fertilizers and pesticides after receiving the agricultural credit, which increased yield per acre and thus the income of the farmers. Furthermore, the study mentioned that the impact of agricultural credit was more significant in non-irrigated and semi-irrigated villages than the irrigated villages.

Akram, Hussain, Ahmad, and Hussain (2013) studied the economic efficiency of credit and non-credit users in agriculture farms using stochastic frontier analysis from the response of 152 farmers from Sargodha District of Punjab Province of Pakistan. The study revealed that access to credit resulted in a higher level of technical efficiency of farmers. Moreover, the study concluded that agricultural credit in the study area helped the farmers obtain farm inputs in time, resulting in a higher level of technical efficiency.

A case study by Upadhyay et al. (2020) on credit use performance and its determinants of farm households from the response of 107 farmers in Chitwan district, Nepal revealed cooperatives to be a major source of credit which is primarily used for household consumption. The major constraints for burrowing agricultural credit from the formal sector include lengthy paper processes, high-interest rates, and bureaucratic corruption on loan approval l, among others. They recommend that government should regulate credit flow to food-insecure households rather than non-productive sectors through a credit awareness program and conducive policies. Furthermore, the government of Nepal should facilitate creating awareness about the terms and conditions of the subsidized loan and carefully monitor the lending institutions whether they are lending to appropriate farmers or not.

Ibrahim and Bauer (2013) analyzed the responses from 300 samples of Dry land in Sudan employing the Heckman Selection Model to study the impact of micro-credit on rural farmers' profit. The study's findings affirmed the fact that farmers with access to credit are better off compared to those who do not have such access. The study recommended that by increasing the size of the loan, efficient and sustainable technology can be made available to farmers to increase farm profits.

Sharma (2014) used the time series data of the Nepalese economy covering the period 2002-2012 to inspect the impact of agricultural credit from commercial banks on GDP growth. This study found a positive and significant influence of agricultural credit on the agricultural GDP of Nepal. However, uses of fertilizer and improved seeds have not shown any significant impact on agricultural GDP. He endorses the extension and deepening of the financial service system in the rural area and facilitates agricultural lending.

Rahman, Hussain, and Taqi (2014) demonstrated a positive association between agricultural credit and farm productivity by analyzing 300 samples from Bawhalpur, Pakistan using the logistic regression method. They concluded that the timely provision of an appropriate amount of loan to farmers is helpful for the enhancement of agricultural productivity as it enables them to purchase high-yielding variety seeds, fertilizers and pesticides.

Dong, Lu, and Featherstone (2010) discerned that production inputs, farmers' capabilities and education cannot be fully employed under credit-constrained situations. The study was based on a survey of 511 households from Heilongjiang Province of Northeast China and used an endogenous switching regression model, they concluded that agricultural productivity in the study area can be increased by 31.6% with the removal of credit-constrained situations. The study further revealed that the productivity and income of credit-unconstrained farmers are higher than those of credit-constrained farmers.

Nosiru (2010) shouldered research to determine the relationship between microcredit program participation and the productivity of smallholder farmers. The research's findings disclosed a significant difference between the productivity of the participating farmers and non-participating farmers. He concluded that the involvement of smallholder farmers in micro-credit programs could improve their livelihoods.

A study undertaken by Kinkingninhoun-Medagbe Florent, Diagne, and Biaou (2010) to determine the effect of agricultural credit participation on farmers' productivity revealed that agricultural credit has a positive significant effect on rice yield. The results disclosed that credit users harvested 70.8 kg per hectare of paddy more than non-credit users. A similar conclusion was drawn by Diagne (2002), Das, Senapati, and John (2009), Bolarinwa and Fakoya (2011) and Ayaz, Anwar, Sial, and Hussain (2011) who revealed, in assessing the impact of agricultural credit, positive and significant impacts of agricultural credit on agricultural output, yield and technical efficiency.

Girabi and Mwakaje (2013) studied the impact of micro-credit participation on the agricultural productivity of smallholder farmers in Tanzania. Using data collected from a random sample of 98 credit participants and non-participants; they concluded that participants in the micro-credit program recorded higher crop productivity than their counterparts. Findings from the above studies have largely concluded that increasing agricultural producers' access to credit has a significant and positive impact on productivity.

3. METHODOLOGY

3.1 Research Methods

3.1.1 Data sources

This study has captured both quantitative and qualitative data. The data sources include:

i. Secondary data:

The information was collected from the Center Bureau of Statistics (CBS), Nepal Rastra Bank, Ministry of Finance, Ministry of Agriculture and Livestock Development, Nepal Planning Commission (NPC), Nepal Economic Survey, and so on. Similarly, relevant journals, articles, news, and reports are also used as secondary sources of information for this study.

ii. Primary data:

The primary data were collected by conducting Key Informant Interviews (KII) with different stakeholders such as the Nepal Bankers' Association (NBA), Nepal Rastra Bank (NRB), Bank Managers of the study area, and Policy makers. Similarly, in-depth interviews are also conducted with farmers (subsidy loan users and non-users) to determine the effectiveness of the subsidy loan program in the later part of the study.

3.2 Research tools and approaches

3.2.1 Literature review

The study was conducted after reviewing the relevant literature and articles to gain a broad understanding of the subsidy loan program in Nepal. The review helped to identify the challenges and areas to focus on while designing the research and conducting data collection.

3.2.2 Key Informant Interview (KII)

Different stakeholders like bank managers of the study area, policy makers, and government officials were interviewed to obtain insights about investment in the agriculture sector of Nepal. The purpose of this interview was to understand the existing agricultural subsidy loan program, its implementation modality and scenario, the effectiveness and appropriateness of such program as well as suggestions for amendment. A checklist (Annex I) was formulated and used to discuss with KII respondents.

3.2.3 Empirical study

i. Sampling Techniques:

The study used purposive sampling techniques to conduct the study. Purposive sampling, also known as judgmental, selective, or subjective sampling, is a form of non-probability sampling in which researchers rely on their judgment when choosing members of the population to participate in their surveys. Based on the data collected from the banks in the study area, a sampling frame of farmers growing vegetables and using subsidized loans was constituted. The farmers who procured subsidized interest loans at least 3 years ago were purposively selected for interview. The counter group of farmers with similar socio-economic conditions was interviewed as well.

ii. Data collection:

The questionnaire (Annex II) for data collection was prepared and pre-tested with 5 non-sample households. Based on the feedback obtained from the pre-testing exercise, minor reforms were done to the questionnaire. Both qualitative and quantitative data were collected–through face-to-face interviews with farmers (vegetable growers) both subsidy loan users and non-users with similar socio-economic status to understand the outcomes of intervention of such a program using the Kobo toolbox. Socio-economic, demographic and agricultural data of the study participants (i.e., household heads) were gathered.

iii. Empirical strategy for data analysis:

This study employed descriptive and inferential statistics, and an econometric model to analyze data. Descriptive statistics, such as mean and standard deviation, were used to present summary statistics of quantitative data about the socio-demographic, economic, and agricultural characteristics of sample households. Inferential statistics, such as t-test and Chi-Square ($\chi 2$) test, were used to assess the existence of statistically significant differences in observations between beneficiaries and non-beneficiaries of subsidy loan program. In this study, vegetable productivity (kg/ropani), the outcome variable, is calculated by dividing the total quantity of vegetables produced in a year by the gross area of cultivation.

The theoretical framework used in this study refers to the process of evaluating the impact of a program on an outcome indicator but raises the problem of counterfactuals. The ideal way to deal with the problem of counterfactuals is to employ Randomized Control Trials (RCTs) following the potential outcome approach or Roy–Rubin model (Martey, Kuwornu, & Adjebeng-Danquah,

2019; Matere, Busienei, & Mbatia, 2020). However, RCTs were not viable in the present study setting due to the non-random allocation of farm households to treatment and control groups (i.e., placement/targeting bias) and selection bias.

The alternative to the experimental approach is the use of quasi-experimental approaches, which seek to create, using empirical methods, a comparable control group that can serve as a reasonable counterfactual (Ojo & Baiyegunhi, 2020). In the present study, among the available non-experimental approaches, the Propensity Score Matching (PSM) procedure is implemented due to the nature of data available for analysis.

iv. Matching methods in evaluating program/treatment effects:

The fundamental notion behind matching is to construct a comparable group of individuals–who are similar to the treatment individuals/groups in all relevant pre-treatment characteristics X–from a sample of untreated ones. In practice, a model (Probit or Logit for binary treatment) is estimated in which participation in a treatment/program is explained by several pre-treatment characteristics and then predictions of this estimation are used to create the propensity score that ranges from 0 to 1.

There are different approaches to implementing PSM, including Nearest Neighbor (NN) matching, Caliper or Radius matching, Stratification or Interval matching, and Kernel and Local Linear matching (Khandker, Koolwal, & Samad, 2009). In the present investigation, Nearest Neighbor Matching, Kernel Matching and Radius Matching are implemented.

There are two assumptions surrounding the implementation of the PSM. The first one is referred to as unconfoundedness (Rosenbaum & Rubin, 1985), selection on observables (Heckman & Robb Jr, 1985), or Conditional Independence Assumption (CIA) (Lechner, 1999). According to this assumption, the treatment needs to fulfill the criterion of being exogenous, implying that any systematic difference in outcomes between the treatment and comparison groups with the same values for characteristics X can be attributed to the treatment. The second assumption, called common support or overlap, ensures that individuals/groups with the same values for characteristics X have a positive probability of being both participants and non-participants of a program/treatment (Heckman, LaLonde, & Smith, 1999). The overlap condition enables a comparison of comparable units. Nevertheless, to deal with the 'curse of dimensionality' problem,

Rosenbaum and Rubin (Rosenbaum & Rubin, 1985) show that if the potential outcomes of treated (Y1) and control (Y0) are independent of treatment allocation conditional on covariates X, then they are also independent of treatment conditional on the propensity score as shown in Eq. 1.

$$P(D = 1|X) = P(X) \quad (1)$$

Generalizing the above issues, assuming that the unconfoundedness assumption holds and there is sufficient overlap between the treatment and comparison groups, the PSM estimator for the Average Treatment Effect on the Treated (ATT) conditional on the propensity score can be written as.

$$ATT = \{E[|D=1, P(X)] - E[|D=0, P(X)]\} \quad (2)$$

This means the PSM estimator is simply the mean difference in outcomes over the common support region, appropriately weighted by the propensity score distribution of treated participants (Caliendo & Kopeinig, 2008).

Several techniques are available to check covariate balancing during the matching process. In terms of mean comparisons, a two-sample t-test (before and after matching) can be used to check the existence or lack of significant differences in covariate means between the treated and comparison groups (Rosenbaum & Rubin, 1985). As a rule-of-thumb, there should not be any significant difference in means after matching.

Sianesi (2004) suggests the comparison of Pseudo-R^2 before and after matching as a method to check balancing. The Pseudo-R^2 indicates how well the covariates X explain the probability of participating in the treatment. The Pseudo-R^2 has to be very low after matching to indicate the success of the matching process. Moreover, the Likelihood Ratio (LR) test on the joint significance of all covariates in the (Logit) model should not be rejected before matching but should be rejected afterward (Caliendo & Kopeinig, 2008).

3.3 Research site

The research was purposefully conducted in Dhunibeshi Municipality which includes previously known VDCs Naubise, Jeevanpur, and Chattredeurali. The research location is about 1085m above the sea level with geographical coordinates varying from 85°11’ E to 85°27’E longitude and

27°43’ N to 27°48’ N latitude. It is situated at a distance of 20 km from the capital city of the country, Kathmandu, which is the major consumer of fresh vegetables.

In the case of agricultural credit flow, 4% of the total agricultural credit flow in the Bagmati province is in Dhading district (NRB, 2022). However, there is no segregation of credit flow information at the local level. Furthermore, there is no systematic and careful empirical investigation regarding subsidy loan programs at any level. This study was conducted in one of the local levels of Dhading district i.e. Dhunibeshi Municipality to gain insight into the flow of subsidized interest loans at such a local level in the vegetable sector.

Dhunibeshi Municipality is well-known as a fresh vegetable supplier to Kathmandu valley. Different types of seasonal and off-seasonal vegetables are produced and supplied to local and urban consumers. Vegetable production is one of the major agricultural activities of farmers in this municipality. Favorable climatic conditions, nearer to the capital city and high profit on investment resulted in extensive vegetable production in Dhunibeshi Municipality. Furthermore, there are several banks in the area providing loans as per subsidy loan program to farmers for various agricultural purposes, including vegetable production. However, there is no aggregate data on such a government intervention in the area. This research conducted by sampling the beneficiaries of subsidy loan program along with farmers yet to be benefitted from it and relevant stakeholders of the program, for instance, bank managers, agriculture officer, elected representatives, and agri-entrepreneurs could provide information regarding agricultural credit flow in the municipality in the farming community, the procurement procedures, hurdles related to it and effectiveness of government investment in vegetable sector in the area. The map of the study area incorporating details regarding the geographical area is presented in Figure 1.

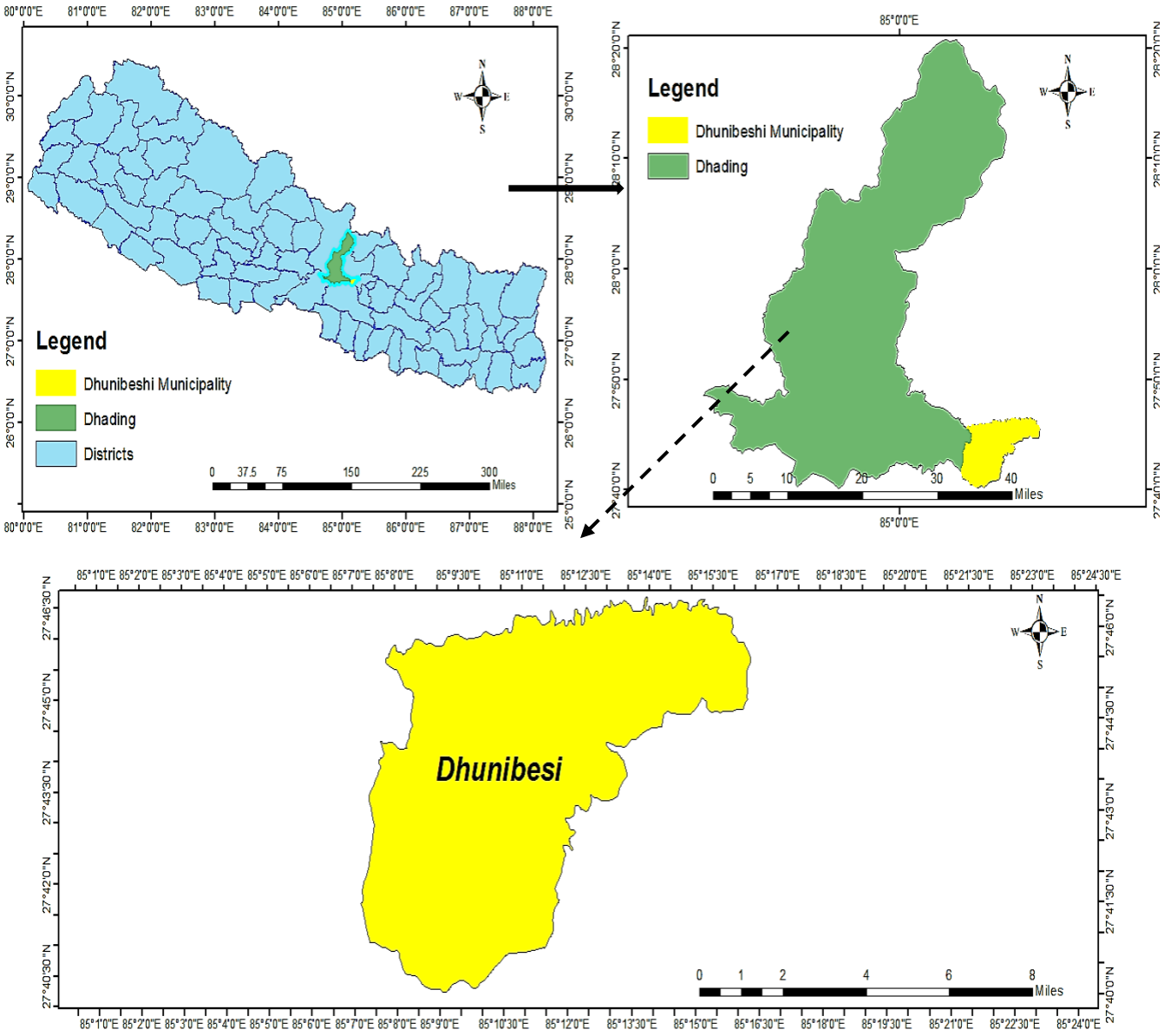


Figure 1. Map of the study area

4. FINDINGS

4.1 Desk study and secondary data analysis

4.1.1 Policy provisions

Nepal government introduced the scheme of subsidy on interest rates in agricultural credit in 2014/15 to ensure farmers' access to capital, improve investment opportunities and increase production. The program was aimed to inspire youths to engage in agriculture and provide access to loans for small-scale farmers. In the budget of the financial year 2014/15, the Nepal government allocated NRs. 1 billion to provide an interest subsidy of up to 4 percent to address the issues of growing unemployment and migration of rural youth and to attract youth to different agricultural businesses. The "Procedures related to interest subsidy provided to youth in commercial agricultural loans, 2014" was passed which marked the formal implementation of the subsidy loan program. During amendments of procedures, the previous "Procedures related to interest subsidy provided to youth in commercial agricultural loans, 2014" was revoked and the "Proceedings related to interest subsidy provided in commercial agriculture and livestock loans, 2016" was implemented. Furthermore, in the budget for the financial year 2017/18, the provision of loans to farmers with a 5 percent interest subsidy was mentioned. In the monetary policy of the same year, by June 2018, the NRB made it mandatory for 10 percent of the total credit of commercial banks to be invested in agriculture. Later, the "Integrated procedure regarding interest subsidy for subsidized loans, 2018" was released and the provision of a 5 percent interest subsidy on agricultural loans up to NRs. 50 million and a 2 percent interest subsidy up to NRs.100 million or above was highlighted. The provision of an individual loan of NRs. 50 million has been revised and increased to NRs. 70 million.

4.1.2 Program achievement and shortcomings

i. Flow of agriculture credit from commercial banks:

The flow of credit from commercial banks in the agriculture sector is shown in figure 2. The agricultural credit flow was on a rising trend and picked a sharp upward after 2016/17 as depicted

by the figure 2. The agricultural credit from commercial banks was (in ten million) NRs. 6516 in 2014/15 which increased by 394 folds and reached (in ten million) NRs. 32420.12 within seven years of implementation of the subsidy loan program. This might be due to the subsidy loan program and more number of beneficiaries attracted toward such a government scheme of investment in the prioritized sector. Furthermore, NRB has made it mandatory for BFIs to invest a specified percentage of credit flow in prioritized sectors.

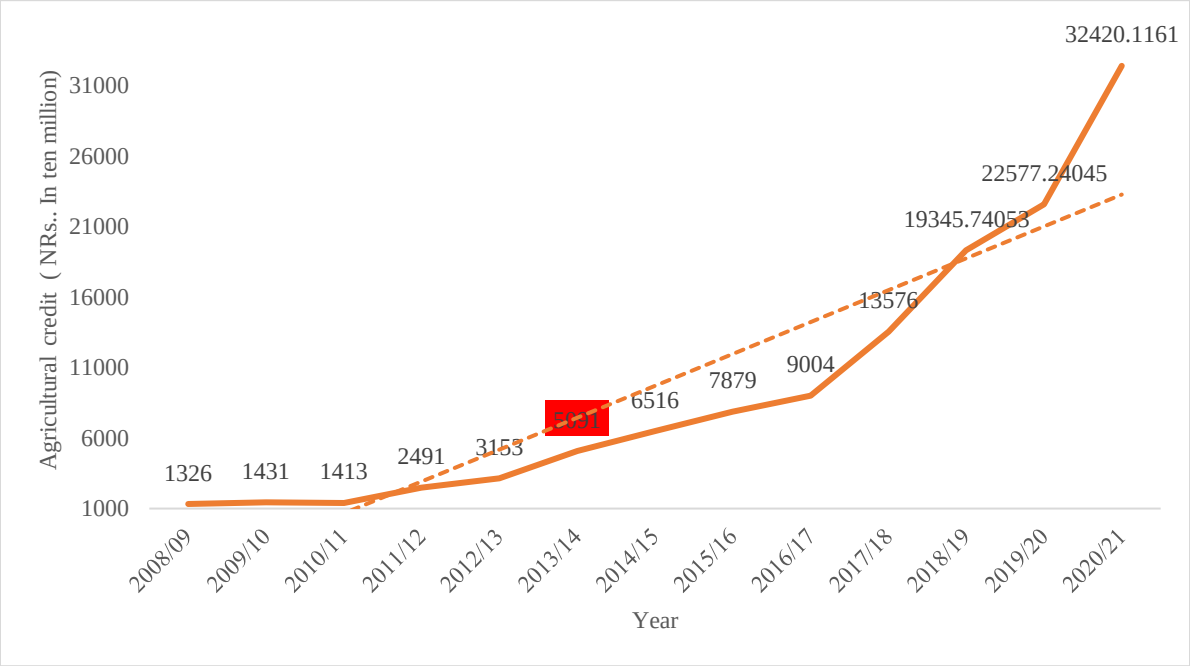


Figure 2. Flow of agriculture credit from commercial banks (NRs. In ten million)

Source: NRB

ii. Beneficiaries of subsidized interest loan:

After the initiation of the subsidy loan program, its beneficiaries have gradually increased and reached 60, 302 with the approved limit of (in 000) NRs. 163,644,254 by the end of October 2022.

Table 2. Number of borrowers of agricultural subsidized interest loan

Time	Borrowers	Approved limit (‘000 NRs.)	Outstanding amount (‘000 NRs.)
2019 July	17203	37126990	32189500
2020 July	24763	63106324	54114109
2021 July	46057	125756083	106978443
2022 Oct	60,302	163,644,254	139,671,844

Source: NRB

In the case of subsidized credit exceeding NRs. 10 million, the number of borrowers has reached 2129. The highest number of beneficiaries are from Bagmati province (901) while the least are from Karnali province (6). The larger number of beneficiaries from the Bagmati province, although the agricultural sector contributes the least (11.1%) to the total GDP of the province, shows the problem of outreach of the subsidy loan program.

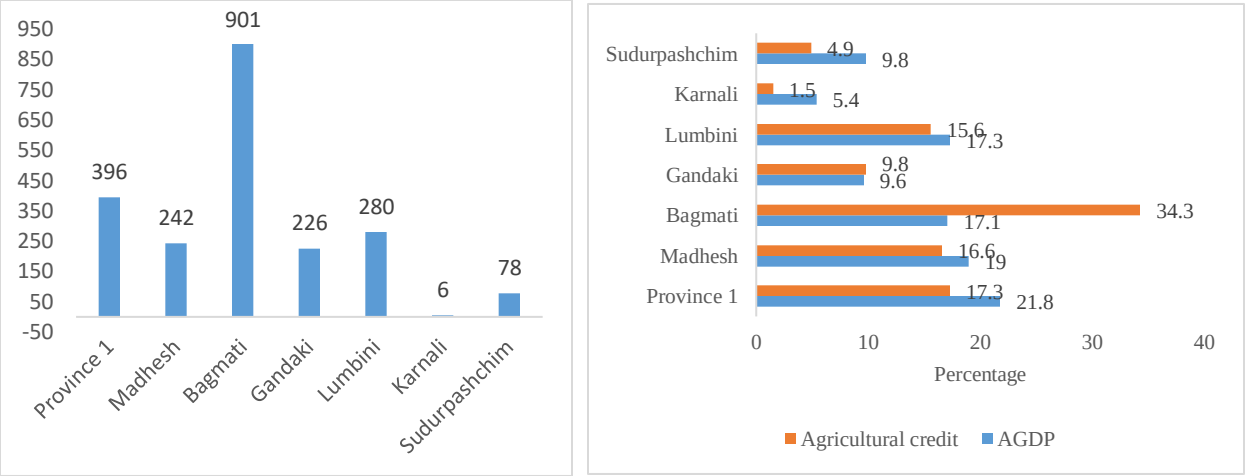


Figure 3. Distribution of agricultural subsidized interest loan

Source: NRB

The flow of agricultural credit is highest in Bagmati province (34.3%), although it contributes only 17.1% to the total agricultural GDP of Nepal and only 11% (least) of its total provincial GDP is contributed by the agricultural sector. The agricultural credit flow is the least for Karnali province (1.5%). The reach of the subsidy loan program is mostly confined to large cities of Nepal with fewer farmers and limited agricultural land while farming communities from the remote districts of Nepal are yet to be benefitted from it (figure 4). This shows the lack of access to such a governmental intervention in rural parts of Nepal and the people outside the target group, concentrated in the city areas, are profiting from it due to irregularities in the distribution of subsidized interest loans.

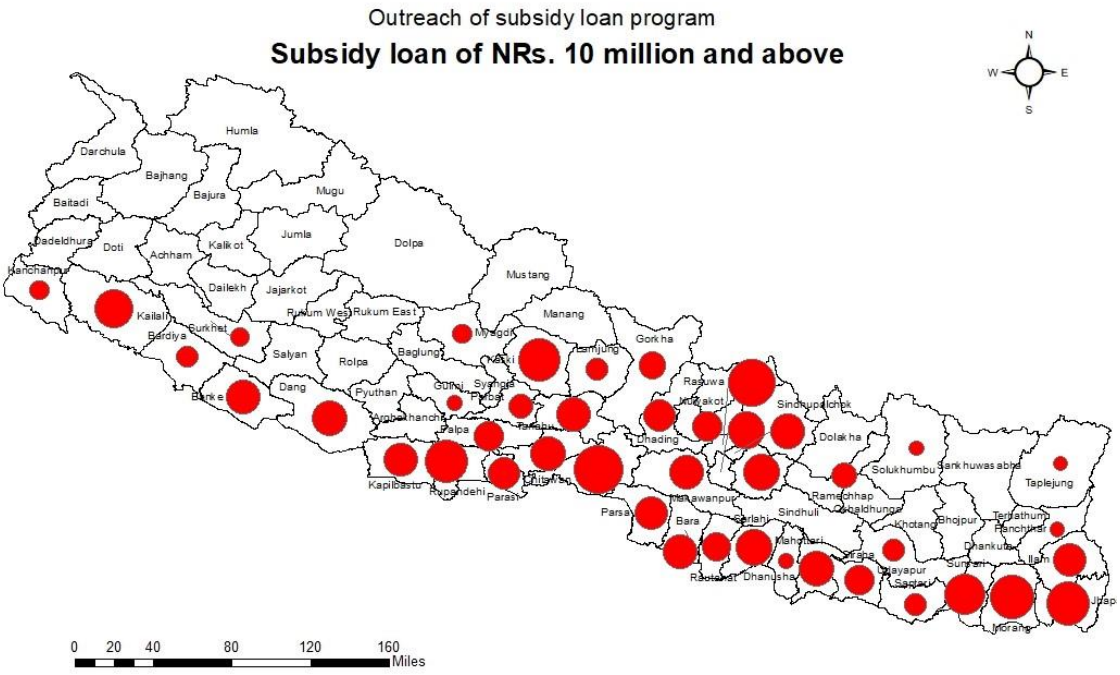


Figure 4. Map of Nepal representing outreach of subsidy loan program

Source: NRB

4.1.3 Agricultural evidence

i. Productivity of major crops in Nepal:

One of the prime objectives of a subsidized loan program is to increase the production and productivity of the agriculture and livestock sectors. The trend in productivity of major crops of Nepal is demonstrated in figure 5. Low productivity of agriculture crops has been a long-lasting problem of Nepal which is yet to be resolved. The data from 2008/09 to 2020/21 showed no improvement in farm performance despite several government interventions. There is a slight improvement in the productivity of cereal crops in Nepal in this long duration, however only by a decimal. The scenario has not changed even after the government's huge investment in the agricultural sector through the subsidy loan program. The productivity of cash crops also shows no increment while that of fruits after the implementation of the program has increased from 8.8 mt/ha to 10.5 mt/ha.

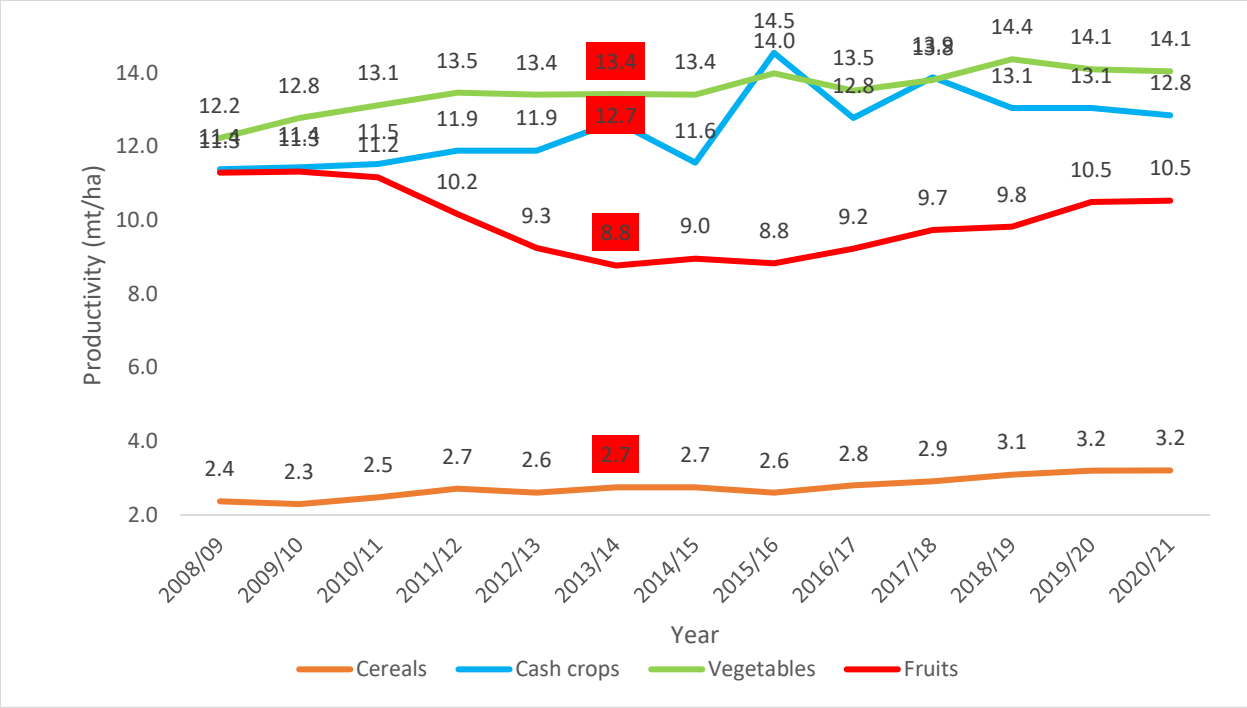


Figure 5. Trend of productivity of major crops in Nepal

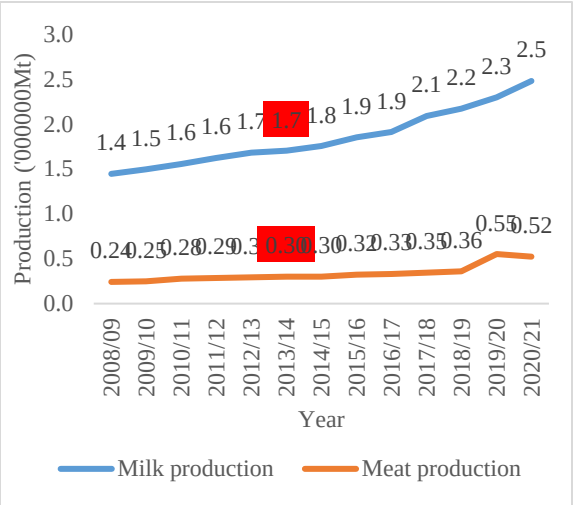
Source: MoALD (2021)

The productivity of fresh vegetables has increased from 8 mt/ha to 14.37 mt/ha in 3 decades. The extensive investment in vegetable production along with improved technology might have resulted in the outcomes. But the fresh vegetable productivity has increased slightly from 13.41 mt/ha to 14.05 mt/ha in course of the implementation of the subsidy loan program.

The trend of national agricultural productivity during these years of implementation of subsidy loan program remains stagnant. There is no significant rise in the productivity of major crops despite huge government investment in the agricultural sector, which raises concern about the effectiveness of such government intervention.

ii. Production of animal products in Nepal:

The production of animal products has improved in the case of some commodities, for instance, animal milk and egg production. Milk production has increased by 47% and egg production by 71% during these seven years of the subsidy loan program. However, there is no noteworthy improvement in the production of meat and wool.



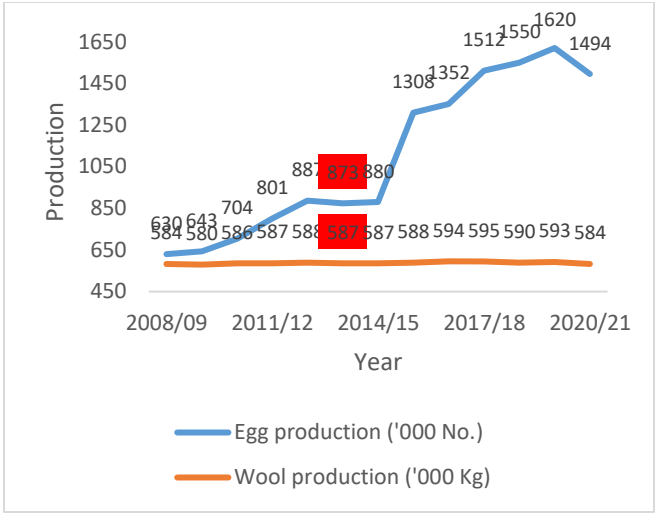


Figure 6. Trend of production of animal products in Nepal

Source: MoALD (2021)

iii. Import of agricultural commodity:

The objectives of the agricultural subsidy loan program include a gradual reduction of agricultural imports through increased agricultural productivity. However, the trade balance is negative for most of the agricultural and animal products. The failure of the subsidy loan program in improving the agricultural productivity of Nepal can also be realized from the data on agricultural imports. Figure 7 delineates the trend of agricultural imports which is in increasing trend despite several government interventions to reduce it. Within the seven years of formulation and implementation of the subsidy loan program, the agricultural imports of Nepal have increased by 233 times and have reached all times high of NRs. 4.3 trillion. This raises concerns about the effectiveness of the subsidy loan program.

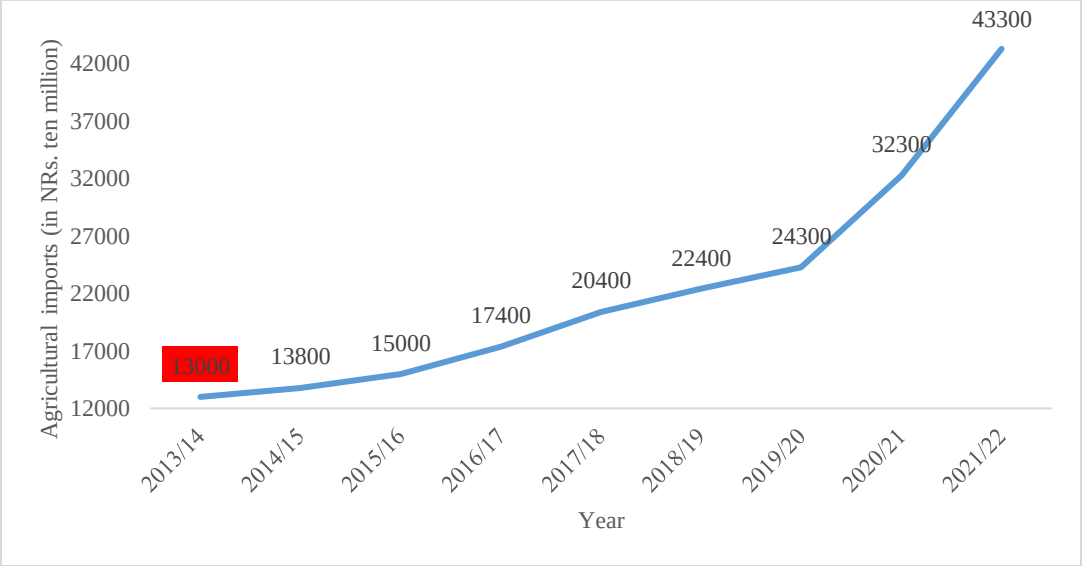


Figure 7. Trend of import of agricultural commodity (in NRs. Ten million)

Source: CBS

iv. Growth rate (Overall economy and Agriculture):

The overall scenario during these years of implementation of the subsidy loan program can also be demonstrated by trends in agricultural and economic growth rates. The agricultural growth rate and overall economic growth rate have several peaks and troughs as depicted in figure 8. The fluctuations in growth rate might be due to massive earthquakes, unannounced economic sanctions by India and in the latest period by global pandemic (Covid-19) along with failures of government interventions enforced to improve the economic performance of the country.

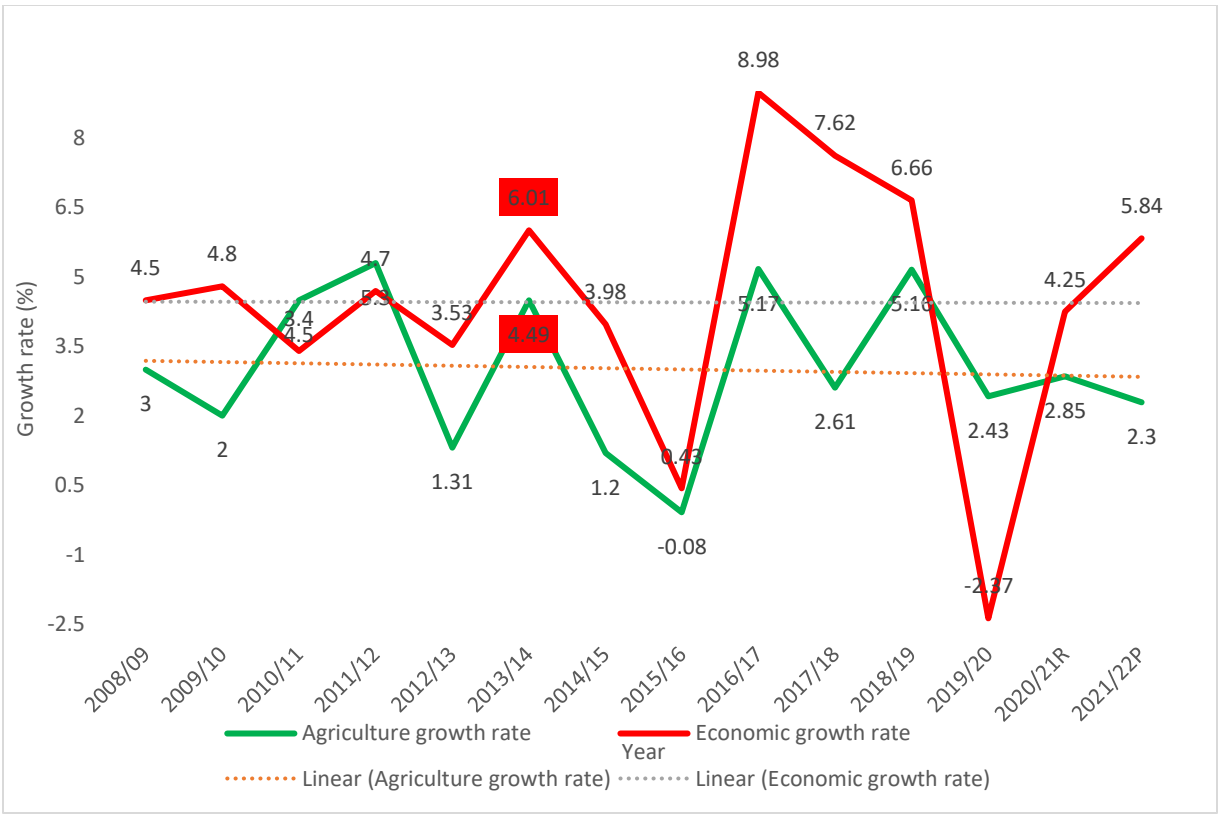


Figure 8. Trend of agricultural and overall economic growth of Nepal

Source: CBS

4.2 Analysis of primary data

4.2.1 Key-informant interview (KII)

This study employed key-informant interviews to assess the status of the subsidy loan program which incorporates the political, economic, social and technical context of the country assisting or hurdling the achievement of goals of the subsidy loan program, its efficiency, effectiveness, relevance, sustainability and challenges of the program. The stakeholders interviewed were policy makers, agricultural officers, bankers and agri-entrepreneurs. The overview and findings of the hey-informant interviews are discussed below.

i. Context:

The political, economic, social and technical contexts of the county are determining factors for the success or failure of any government intervention. The government has continued the allocation of the budget for concession loans in the deprived sectors including agriculture. However, the

unstable political situation of the country and changing priorities of government due to unforeseen circumstances like the global pandemic have hampered the effective implementation of such intervention. The liquidity crisis limited large investments in agriculture, but it has not affected small investments in agriculture. Furthermore, growing financial literacy as shown by increasing bank accounts is spreading information and technical know-how about the subsidy loan program.

ii. Relevance of the program:

The subsidy loan program was introduced to address the problem of credit flow in agriculture. In the rural area of Nepal, 80% of loan needs come from informal sources with high cost whereas only 20% form formal sources. In such a scenario, the introduction of such a program is welcoming to increase the access of small farmers to formal credit sources. The increasing number of banks and their branches along with their outreach in remote areas of Nepal is improving credit access in farming communities. However, there is serious concern about the relevance of the subsidy loan program, as the beneficiaries of the program are mainly the larger agricultural firms from the cities while small farmers are facing obstacles to benefit from it, although it was introduced to engage rural youth in agri-business and address the growing problem of unemployment and youth migration. The well-connected and wealthy farmers are reaping the benefits of such a program while genuine farmers, especially small and marginal farmers are deprived of it.

iii. Efficiency of the program:

The government has made a large investment to improve the financial access of small farmers and by Oct 2022, a huge sum of about NRs. 20 billion as an interest subsidy under the subsidized interest loan as a whole. However, the benefit from such an intervention is not noteworthy as the nation's agricultural productivity remains somewhat the same and the imports of agricultural goods are raising yearly. Furthermore, banking services are still limited in urban and peri-urban areas of Nepal and remote farmers are struggling to access formal banking services. There are also questions regarding the utilization of such loans. There are several reporting of misuse of subsidized interest loans by affluent businessmen and also the procured loan even by real farmers are misusing it for other purposes, for instance, payment of the outstanding loan, abroad employment or education enrollment and investment in land acquisition, instead of firm expansion and improvement. Such circumstances probe the efficiency of the subsidy loan program.

iv. Effectiveness of the program:

Since the introduction of the subsidy loan program, the flow of agricultural credit from commercial banks has increased by 233 times. The PSLP of NRB has mandated the BFIs to invest in deprived sectors of the economy which further has propped agricultural investment. However, rural farmers are still dependent on costly informal credit sources. The outreach of this program has been found limited to affluent businessmen and farmers in city areas, the agricultural productivity remains the same and the agricultural imports have been increasing which raises concern about its inclusivity and effectiveness.

v. Sustainability of the program:

The subsidy loan program has burdened the financial management of the government given the situation of the cost of the program outweighing its benefits. The disproportionate outreach of this program is another concern. Some government officials claim the complete failure of this program due to misuse of the loan. The government of Bagmati province is even considering discontinuing such agricultural subsidies. The policy hurdles and banking complexities of the program are a hindrance to its sustainability.

vi. Challenges and experiences related to the program:

Several challenges associated with the subsidy loan program are yet to be addressed. The relevant stakeholders and the target group of the program face various obstacles regarding such a program. Such hurdles hamper the effective implementation of the program and the achievement of its goals. The problems related to the program are enlisted below.

a. Banking experience/Hurdles on subsidy loan:

- The bank estimates working capital based on stock, receivable and payable of the enterprises, which is valid for trading business, but not practical for agricultural enterprise (production aspect).
- The agricultural production cycle is complex and different from the trading cycle. However, financing is not based on the cost of cultivation required for the year-round production of particular crops or livestock.

- Farmers are of different categories in Nepal and their requirements vary. But the subsidy loan program is common for all farmers with no segregation of agricultural credit along with documents required for each category.
- Poor agricultural roads, lack of irrigation facilities, poor electricity facilities, unorganized markets, unsure of getting agri-inputs etc. have propelled many risks in the agriculture sector which reduce the confidence of BFIs for agricultural financing.
- The reluctance of insurance companies to insure crops and livestock even though it is mandatory for agribusiness procuring credit of NRs. 1 million or above.
- The loan ceiling of NRs. 70 million discourages larger agri-enterprises.
- There are inadequate agriculture financing professionals in BFIs (human resources), an absence of technical norms (agri-production guidelines), insufficient agricultural lending policies/guidelines etc.
- The small volume of agriculture loan demand thereby making high operating costs is another bottleneck for BFIs.
- Social collaterals (especially cooperatives) are prone to defaults, so banks are reluctant to disburse loans based on such collateral.
- Local bodies, provincial governments and federal governments all have some sort of subsidy and grant schemes in agriculture with no robust database system. This has caused not only the duplication of facilities but also BFIs to be in trouble with lending and maintaining the norms of 'Integrated Guideline for Interest Subsidy to Concessional Loan, 2075'.
- There is poor monitoring of concession loans and a lack of skilled manpower for evaluating agri-enterprise from both, Nepal Rastra Bank as well as credit lending banks.
- The beneficiaries of the subsidy loan program are utilizing such loans in other non-farm activities while small needy farmers are being devoid of access to such schemes.
- Poor financial and banking literacy among the farmers' group. Farmers are not familiar with the subsidy loan program and its banking procedures.

b. Policy constraints:

- There is an inadequate amount of allocation by the government for the subsidy loan program.

- "Integrated Guideline for Interest Subsidy to Concessional Loan, 2075" is not so farmer-friendly.
- Chapter 4 (Parichhed 4) of section 10, sub-section-5 says no concession is given to farmers if he/she has taken even a small amount of subsidy previously for the project from the local/provincial or federal government.
- Chapter 2 (Parichhed 2) of section 4 of sub-section-1 tells that the concessional can be given for a maximum of 5 years. But the loan collection process can only be started after 6 months of the loan period (after $5^{1/2}$ years) if it has defaulted. This provision is not practical for the BFIs.
- The same guidelines explain that subsidy loans can be sanctioned only to those farmers who have been involved in the entire value chain process (production to marketing), which is not feasible for a large proportion of small farmers in Nepal.
- Chapter 2 (Parichhed 2) of section 5 of sub-section-1, has the provision of an interest rate of base rate+2%, which is fluctuating thus fluctuating subsidy interest rate. This creates confusion among farmers.
- **"Integrated Guideline for Interest Subsidy to Concessional Loan, 2075**" does not clearly state whether the concessional loan can be extended to purchase land for running agricultural enterprises while there is a continuous demand of clients to get a concessional loan to purchase land to run agri-business.

c. *Farmers' experience with the subsidy loan program:*

- The upper limit of subsidized interest loans is lower for large agri-businesses and thwarts the expansion of such businesses.
- Farmers who are operating agriculture-based micro-enterprises in rural areas do not have access or ideas to register with the concerned authorities as a firm or company, subsidy loan program and bank procedure.
- Subsidy loan procedures involve lengthy paperwork and banking complexities.
- Inadequate collateral of small farmers possesses eligibility issues. Furthermore, crops are not considered collateral and livestock are undervalued.
- There is no provision for a pass loan in case of agricultural loss due to natural calamities, insect-pest, diseases, or floods.

- Real farmers are never the beneficiaries of such government programs and paper-backed farmers are exploiting such provisions.

4.2.2 Empirical study of the impact of subsidy loan program on agricultural productivity

i. Socio-economic attributes:

The majority of respondents in the study were Brahmin/Chettri (54.39%). They also constituted the greater proportion of the beneficiaries (23.98%) of the subsidy loan program followed by Dalits (11.70%).

Table 3. Categorical variables of survey respondents

Variables	Beneficiaries of subsidized loan			$\chi 2$-value	P-value
	No	Yes	Total		
Ethnicity				6.45	0.168
Brahmin/Chettri	52(30.41)	41(23.98)	93(54.39)		
Dalit	14(8.19)	20(11.70)	34(19.88)		
Magar	10(5.85)	8(4.68)	18(10.53)		
Newar	6(3.51)	5(2.92)	11(6.43)		
Tamang	12(7.02)	3(1.75)	15(8.77)		
Gender of HH				0.902	0.342
Female	20(11.70)	12(7.02)	32(18.71)		
Male	74(43.27)	65(38.01)	139(81.29)		
Total	94(54.97)	77(45.03)	171(100.00)		

Note: Values in the parentheses denote percentages.
Source: Own estimation based on survey data

Furthermore, 81.29% of houses were male-headed while only 18.71% were female-headed. This is less than the national female household head proportion of 25.9% and that of Dhading district (27.82%) (CBS, 2011). The study also showed most of the benefited families of subsidy loan programs were male-headed (38.01%).

Table (4) shows descriptive statistics on various socio-economic and agriculture-related variables. As shown in the table, there exists a statistically significant difference between the respondents of beneficiaries and non-beneficiaries of the subsidy loan program regarding total family income, income from vegetable production, the proportion of agricultural to total family income, types of vegetables grown annually and vegetable productivity. All these attributes are significantly higher for beneficiaries of the subsidy loan program compared to their counterparts.

Table 4. Socio-economic and agricultural variables of survey respondents

Socio-economic variable	Overall (n=171)	Non-beneficiaries (n=94)	Beneficiaries (n=77)	Mean difference	P-value
Age of HH	53.58± 15.58	54.81± 16.71	52.07± 14.05	2.74	0.25
Years of schooling of HH	4.12± 3.66	3.86± 3.51	4.44 ±3.83	-0.58	0.31
Family size	5.16± 1.47	5.07 ±1.27	5.28±1.68	-0.21	0.37
Dependency ratio	0.52± 0.45	0.56±0.49	0.47±0.38	0.09	0.15
Non-farm jobs	1.09±0.74	1.11±0.77	1.08±0.70	0.03	0.80
Total family income (NRs.)	857421± 302032	783760±270944	947345± 315146	-163585***	0.00
Non-farm income (NRs.)	255424± 15982	270075± 20233	237539±25488	32536	0.31
Total land owned (ropani)	7.42± 5.59	7.97± 5.91	6.74± 5.13	1.22	0.15
Agricultural variables					
LSU	1.30±0.89	1.30±0.91	1.30±0.88	-0.005	0.97
Income from vegetable production	533772±309898	442753±290688	644885±297764	-202131***	0.00
Income from livestock	68224±55648	70930±56255	64920±55082	6010	0.48
Agriculture to total family income	68.04±25.15	62.90±26.82	74.31±21.51	-11.40***	0.00
Types of veg grown in a year	3.98±1.42	3.80±1.43	4.19±1.41	-0.39*	0.08
Gross veg area	5.92±3.53	6.29±3.84	5.46±3.07	0.824	0.12
Productivity	5291±3397	3534±1231	7435±3935	-3901***	0.00

Note: ± denotes standard deviation, and p-values are the result of Welch's t-test. ***, ** and indicate significance at 1%, 5% and 10% respectively.
Source: Own estimation based on survey data

ii. Loan procurement:

Out of 171 respondents, 77(45.03%) respondents had procured a subsidized interest loan while 94(54.97%) had not procured it yet. A majority of beneficiaries (80.52%) had procured subsidized interest loans from commercial banks. In the case of non-beneficiaries of the subsidy loan program, 35(37.23%) respondents had not procured any sort of loan yet while 33(35.11%) of them had taken loans from farmers' groups/cooperatives for agricultural purposes. Other sources of the loan of non-beneficiaries of the subsidy loan program include microfinance (10.64%) and relatives or friends (17.02%).

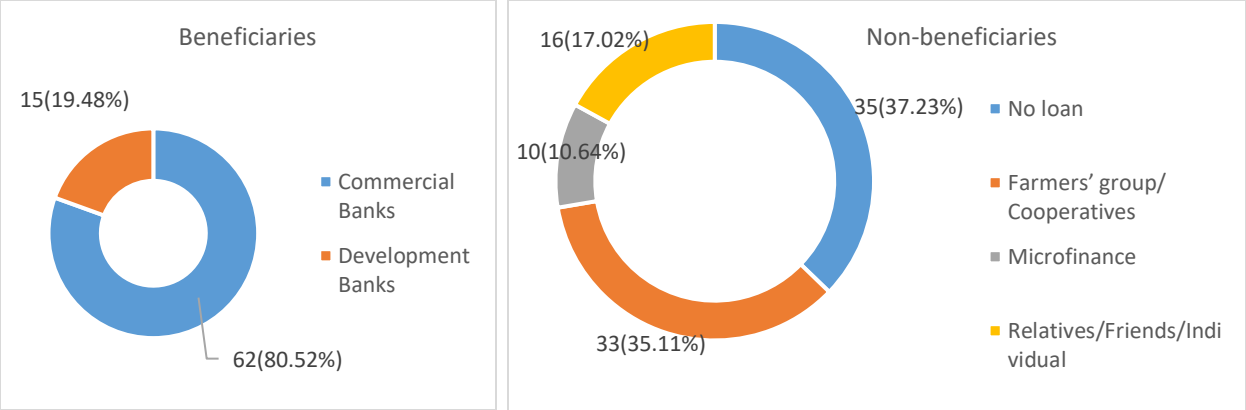


Figure 9. Sources of loan for beneficiaries and non-beneficiaries of subsidy loan program
Source: Own estimation based on survey data

The interest rate paid by beneficiaries of the subsidy loan program was found significantly lower (5.61% p.a) compared to their counterparts (13.51% p.a) who had procured the loan from different sources.

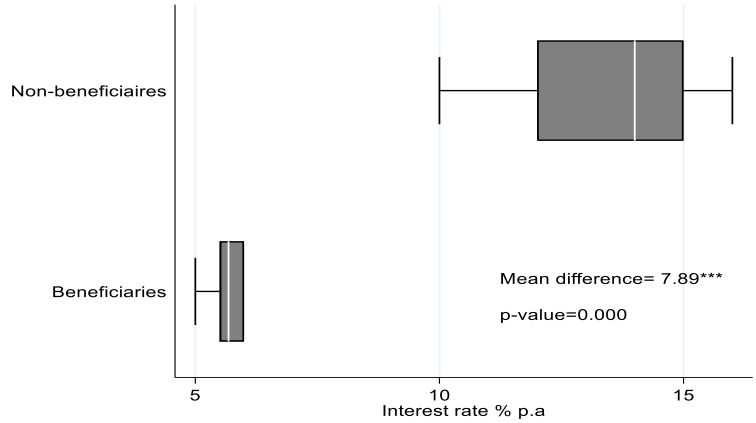


Figure 10. Interest rate for the procured loan by survey respondents
Source: Own estimation based on survey data

The beneficiaries of the subsidy loan program complained regarding the demand and supply of subsidized interest loans. The majority of them (64.94%) responded to have obtained an insufficient amount of loan than what they demanded. The mean percentage of loans obtained was found to be 77.5 % of the total loan demanded.

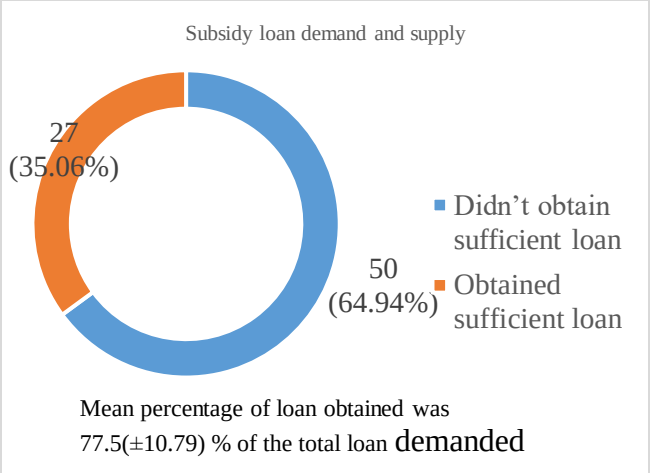
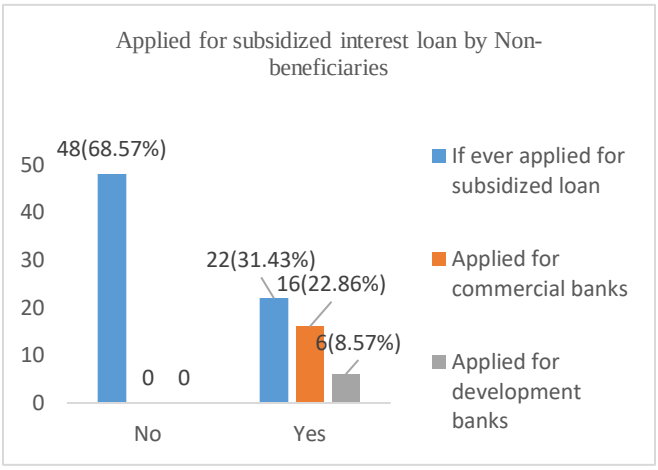


Figure 11. Proportion of demanded loan obtained in the subsidy loan program
Source: Own estimation based on survey data

The study revealed that a greater proportion of non-beneficiaries (74.47%) of the subsidy loan program had information about it, but only 31.43% of them had applied for a subsidized interest loan but did not receive it.



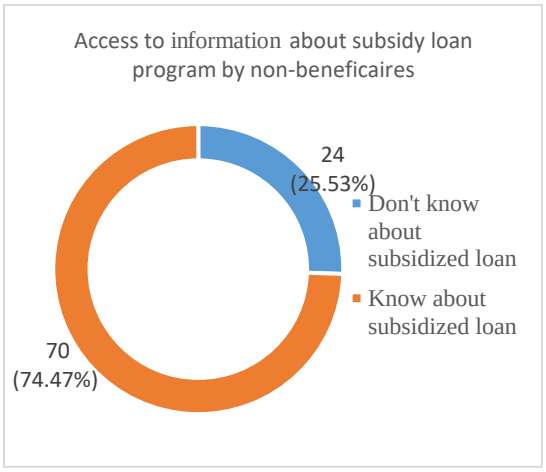


Figure 12. Access to information on the subsidy loan program
Source: Own estimation based on survey data

Furthermore, there are different complexities in receiving a subsidized interest loan. The study shows that the majority of beneficiaries and non-beneficiaries perceived that the subsidy loan procurement is difficult. Only 16 out of 77 beneficiaries of the subsidy loan program found it easy to procure such loans.

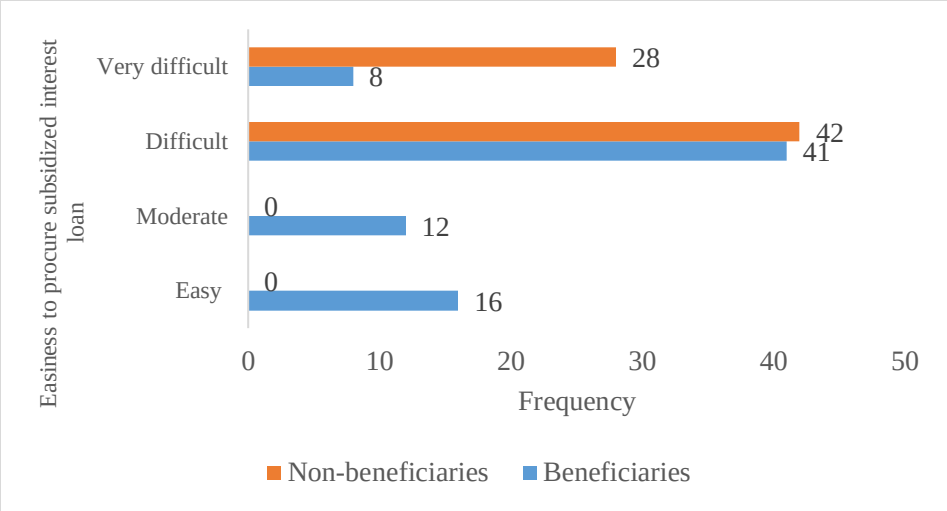


Figure 13. Perception of survey respondents on procurement of subsidized interest loan
Source: Own estimation based on survey data

There are several hurdles in the procurement of subsidized interest loan which includes the lengthy procedure, lots of paperwork, inadequate or difficulty to manage the mortgage, ignorance by banks etc. The majority of beneficiaries of the subsidy loan program found the procurement of subsidized interest loans involves a lengthy procedure, lots of paperwork and difficulties in managing a mortgage. Similar was the perception of non-beneficiaries who were known regarding the subsidy loan program.

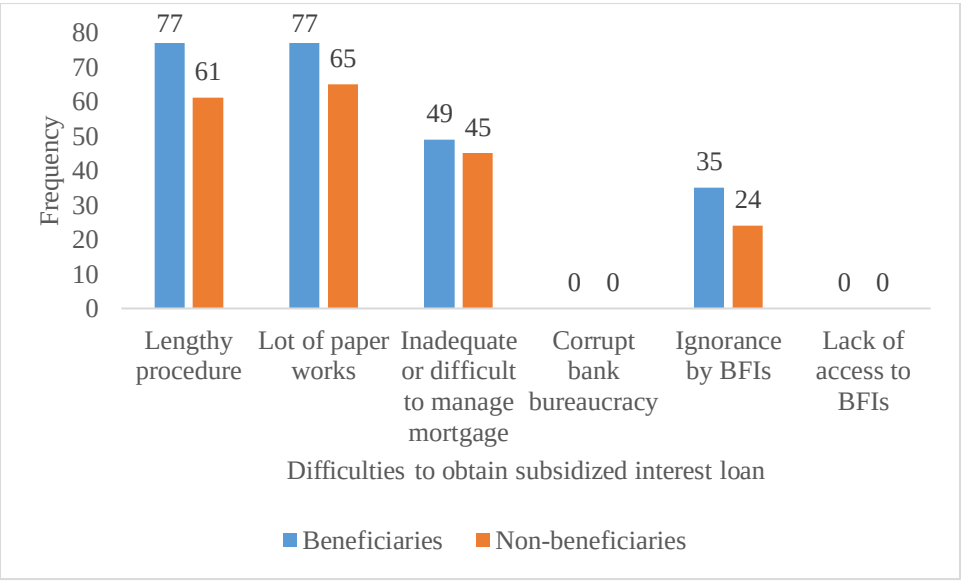


Figure 14. Different hurdles perceived by survey respondents on subsidy loan procurement
Source: Own estimation based on survey data

The key informant interview revealed the misuse of subsidized interest loans. This was further corroborated by the empirical study which demonstrated that the majority of beneficiaries (63.64%) of the subsidy loan

program had used the procured loan for purposes other than agriculture. The subsidized interest loan was misused mainly for abroad jobs or enrollment followed by payment of an outstanding loan.

Figure 15. Utilization of loans by beneficiaries of subsidy loan program
Source: Own estimation based on survey data

iii. Determinants of farmers' participation in the subsidy loan program:

The logit model was used to determine the propensity score and its result is shown in the table. The logistic regression indicates that the age of the household head, non-farm income, and access to training and the proportion of agricultural income to total family income are significant predictors of participation in the subsidy loan program.

In terms of the age of the household, it appears that the families with older household heads were less likely to participate in the subsidy loan program compared to the families with younger household heads. This might be because older farmers are risk averse. The non-farm income was positively related to farmers' participation in the subsidy loan program. Higher non-farm income enables farmers to pay the bank interest on time and minimize repayment defaults (Zhou, 2011). The access to training was negatively related to farmers' participation in the subsidy loan program. Trained farmers are more capable of using available farm resources effectively and efficiently and might not seek additional resources to invest. However, training and farming experience are pre-requisite attributes of farmers sought by banks for the eligibility of the subsidy loan program. The proportion of agricultural income to total family income positively influenced farmers' participation in the subsidy loan program. Higher income from agriculture attracts farmers to invest more in agricultural assets, improved technology and modern farming practices which might encourage them to seek agricultural credits.

Table 5. Logistic regression of determinants of participation of subsidy loan program

Variables	Coefficient	Standard error	z	P>z
Ethnicity	-0.197	0.138	-1.430	0.153
Age of HH	-0.040	0.016	-2.530**	0.011
Gender of HH	-0.197	0.550	-0.360	0.721
Years of Schooling of HH	0.018	0.061	0.290	0.773
Years of farming	0.030	0.026	1.130	0.257
Family size	0.192	0.156	1.230	0.218
LSU	-0.179	0.215	-0.830	0.406
Non-farm income	0.000	0.000	2.990***	0.003
Training received	-1.130	0.523	-2.160**	0.031
Agriculture to total income	0.074	0.018	4.110***	0.000
Number of observation				171
Pseudo R^2				0.1490***
LR chi^2 (10)				35.07
Log-likelihood				-100.14609

Note: ***, ** and * indicate significance at 1%, 5% and 10% levels, respectively.
Source: Own estimation based on survey data.

The logistic regression also demonstrates that the education of the household head, farming experience and family size influenced positively while female-headed households and livestock units influenced negatively the participation of farmers in the subsidy loan program, although found statistically insignificant.

iv. Estimation of the average effect of subsidized interest loans on productivity:

Estimation of the average effect of subsidized interest loans on farm productivity of beneficiaries of subsidy loan program (ATT) was performed on Stata using psmatch2 (Leuven & Sianesi, 2003). The results are presented in table (6). Accordingly, the average effect of the subsidy loan program on the farm productivity of beneficiaries is positive and significant, ranging from 3872 kg/ropani (Nearest Neighbor) to 3896 kg/ropani (Kernel), on average. All the matching algorithms showed a positive and highly significant effect of the subsidy loan program on the farm productivity of beneficiaries.

Table 6. The average effect of subsidized interest loan on productivity

Matching algorithm	Average treatment effect (ATT)	Bootstrap standard error	t-value
Nearest neighbor matching	3872.302	604.631	6.404***
Kernel Matching method	3896.835	527.611	7.386***
Radius matching	3873.94	481.126	8.05***

*** indicates statistical significance at the 1% level.
Source: Own estimation using survey data.

v. Matching quality analysis: t-test results before/after matching:

Regarding matching quality and common support condition, similar to Siamese (2004) and Arpino and Aassve (2013), we implemented mean comparisons (before and after matching) and overall measures of covariate imbalance to check matching quality.

Table 7. Matching quality analysis: t-test results before/after matching.

	Unmatched (Mean and t-Test)			Matched (t-Test between Treated and Control Groups)		
Variables	Beneficiaries	Non-beneficiaries	t-test	Nearest neighbors	Kernel	Radius
Age of HH	52.078	54.819	-1.150	0.65	0.90	0.96
Gender of HH	0.844	0.787	0.950	1.22	-0.11	-0.03
Years of Schooling of HH	4.442	3.862	1.030	0.9	0.28	0.21
Years of farming	14.338	12.862	1.330	-0.34	-0.17	-0.08
Family size	5.286	5.074	0.930	0.53	1.26	1.42
LSU	1.308	1.302	0.040	0.35	0.71	0.69
Non-farm income	2.40e+05	2.70e+05	-1.010	1.1	0.6	0.56
Training received	0.130	0.160	-0.540	-0.67	-0.32	-0.41
Agriculture to total income	74.313	62.904	3.020***	-0.74	-0.31	-0.26
Ethnicity	1.818	2.064	-1.230	0.36	-0.10	-0.25
Mean			17.3	10.9	7.6	7.4
Median			15.6	10.2	4.9	3.7
Pseudo R^2			0.149	0.027	0.016	0.017
LR chi^2			35.02	5.77	3.38	3.67
p> chi^2			0.000***	0.834	0.971	0.961

*** indicates statistical significance at the 1% level.
Source: Own estimation based on survey data.

The mean comparisons between the two groups before matching indicate the existence of significant differences for only one covariate. However, the post-matching t-test results indicate

that the variable shows no significant differences, suggesting that the different matching procedures enabled the balancing of the covariates. The bottom half of table (7) contains the overall measures of covariate imbalance. Accordingly, the original mean bias of 17.3 in the unmatched sample is reduced to less than 11. Similarly, the significant reduction of the Pseudo-R^2 original value in the unmatched sample also guarantees that the matching procedures were effective in reducing the existing bias.

Finally, the PS graph (Figure 16) indicates the existence of a good overlap between the propensity scores of treatment and comparison respondents. Out of the 171 respondents in the pooled sample, 77 and 94 treatment and comparison respondents are on common support, respectively.

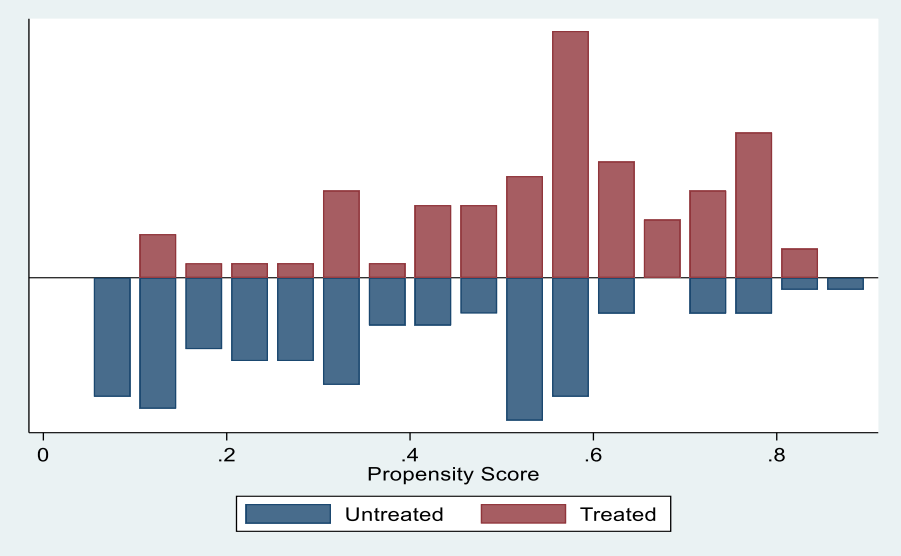


Figure 16. Histogram of estimated propensity score between participants (treated) and nonparticipants of subsidy loan program

Source: Own estimation based on survey data.

5. DISCUSSION

This study employed different methodologies to assess the effectiveness of a subsidy loan program, government intervention in the agricultural sector to address the problem of increasing unemployment, youth migration from rural to urban areas and to attract young generation in different agri-businesses, to boost agricultural productivity of the country. The empirical study of the program using the propensity score matching reveled its positive and significant influence to increase farm productivity level at the ground level. The availability and accessibility of cheap agricultural credit assist farmers to invest in agricultural assets (Petrick, 2004) and efficient farming technology, thereby reducing the cost of production and improving farm performance. A similar result has been found by Owusu (2017) in his study about credit access and farm productivity. However, the study by Kannan (2011) demonstrated an insignificant effect of subsidy loans on crop productivity. The determining factors for farmers' participation in such subsidy loan programs include the age of the household head, non-farm income, access to training and income from agriculture. The negative relationship between age and credit accessibility is consistent with the study of Luan, Bauer, and Kuhl (2016). The non-agricultural income, related to financial stability, has positive influence on credit access which reinforces the findings of previous studies, for instance, Luan et al. (2016) and Duong and Nghiem (2014). The accessibility of training and credit access, however, was found to have a negative relationship although access to agricultural training is one of the prerequisites mentioned by banks in the study area for the eligibility of subsidy loan program. This finding is in contrast with the study by Aliero and Yusuf (2017) who concluded no significant relationship between volume of formal credit and number of training received by entrepreneur. Furthermore, the agricultural income has positive relationship with credit access. Additionally, the banks in the study area of claimed of providing subsidized interest loan to real farmers whose production capacity and thereby agricultural income can be taken as references to disburse loan under subsidy loan program.

The subsidy loan program was introduced to improve agricultural productivity consequently. The program resulted in a significant rise in the flow of credit from BFIs in the agricultural sector. The number of beneficiaries of the program is also increasing. However, national agriculture production and productivity remain unchanged despite such programs. The empirical study showed a positive influence of such a program on agricultural productivity but, the national data

showed no significant improvement in the productivity of major crops and agricultural imports continue to rise. The overall economy and agricultural growth rate have shown no improvement in these seven years of program implementation. There are several reasons for the failure of the subsidy loan program. The agricultural investment has mostly occurred in the marketing aspect of agriculture rather than production. The majority of investment has taken place in large cities where there are comparatively fewer agricultural lands and the program has lower outreach to remote areas of Nepal. The big businesses are reaping the benefits of the program while a greater proportion of farmers have no access to it and are procuring loans from informal sectors at higher interest rates. The BFIs responsible for the disbursement of subsidized interest loans are reluctant to the scheme due to poor technical and infrastructural backups from concerned institutions along with policy hurdles. Furthermore, the farming communities face obstacles to procuring such loans such as financial illiteracy and bank procedural complexities. Additionally, the empirical study shows the disproportionate flow of information on the subsidy loan program and the misuse of the loan for other purposes rather than agricultural production.

6. RECOMMENDATION

a. Policy amendments:

- The loan repayment system should be based on crop/livestock/agri-business specifics. Some agri-business begin to produce after 3-4 years, particularly in the case of perennial crops, so a maximum of 5 years of the loan period is not feasible for such commodities. A loan period of 10 years is recommended for fruit crops and cold storage. Furthermore, the provision of a matching interest payment system with crop cycle is advised.
- The interest rate of subsidized interest loans should be fixed (for instance 10%), irrespective of fluctuating basal rate of each bank.
- NRB licensed bank should be requisitioned to invest the subsidy loan of NRs. 5 billion within a fixed period, the failure to achieve it should be strictly penalized.
- Categorization of farmers and agri-enterprises and provisions of loan sanction amounts based on the groups should be enforced instead of umbrella disbursement of subsidy loans.
- Beneficiaries defaulting on subsidy loans based on social collateral should be deprived of services provided by the government (Citizenship, Passport, Birth certificate)
- Provisions of subsidy loan supply from micro-credit should be initiated with strict supervision from NRB-licensed BFIs.
- A quota system of subsidy loan disbursement for large, medium and small farmers should be initiated. Similar provisions for different stages of the value chain of an agricultural commodity, for instance, 50% loan in production, 30% loan in processing and 20% in storage and marketing.
- Provisions of crops and livestock as bank collateral for farmers with rented land and appropriate valuation of such collateral for subsidy loans should be enforced.
- There should be a provision for the submission of an annual report to Nepal Rastra Bank on the effectiveness of the subsidy loan program at each local level prepared in coordination among local representatives and stakeholders.
- Each local level should have class A BFIs operating and providing subsidized interest loans.
- The upper limit of NRs. 7 million subsidy loan should be removed depending on agri-business.

- There should be the provision of defaulting subsidy loans by a certain margin based on agri-business in case of failure of it by some unforeseen circumstances like natural disasters, insect pests, diseases etc.
- There should be a clear description of the subsidy loan program for the acquisition of agricultural assets like land. Previous beneficiaries of government grants should also be made eligible for subsidy loans.

b. Program implementation reforms:

- Effective data management and information system should be maintained by local government in coordination with other stakeholders.
- Local government and BFIs should prioritize and provide training on financial literacy and subsidy loan procedures at the grassroots level.
- The subsidy loan bank complexities should be simplified and one-door service for loan procurement should be enforced by local government coordinating with stakeholders.
- Local government should maintain complete information on farmers and should recommend Dalits, marginalized and small farmers to such programs while making the provisions of collateral for such groups of farming communities.
- Periodic reviews of the subsidy loan program at each level and monitoring of the use of subsidy loans should be done to improve program implementation in presence of representatives from NRB, MOAD and local stakeholders.
- The program should identify and prioritize small, marginalized and family-run farms under such a scheme to improve inclusivity of the program.

c. Institutional reforms:

- Local governments and banks should manage separate sections on concession loans with adequate technical manpower for extension services and effective disbursement of subsidy loans.
- Government-owned banks specialized in agriculture and related field should be prioritized to invest in the commercialization, diversification and industrialization of agricultural pocket areas by opening bank branches.

- BFIs should hire skilled agriculture graduates for the evaluation and preparation of agriculture projects and work procedure related to subsidy loans.

7. CONCLUSION

This study assesses the effectiveness of the subsidy loan program to improve the agricultural productivity of a country. The beneficiaries of this program are increasing and investments in the agricultural sector have tremendously improved. But still, the national agricultural productivity has shown no improvement during these years. However, the empirical study shows a positive and significant effect of the subsidy loan program to increase farm productivity which shows the potential of such government intervention if it reached the real farmers. Socio-economic attributes of farmers, age, income and access to training drive farmers' participation in such a government scheme.

Although the subsidy loan program is an important measure to increase agriculture innovation and investment, enhance productivity and improve the livelihood of farmers, the shortcomings of the program at the policy, implementation and institutional levels have hampered the relevance, efficiency, effectiveness and sustainability of the program. The benefactors of the program are facing hurdles to implementing the program and opulent groups are reaping the benefits of the program while the needy farming communities remain deprived of it.

The significant contribution of the agricultural sector to national GDP and employment, along with favorable agro-ecological zones, agriculture diversities, favorable climate, and potential of water resources to be used in agri-commercialization for not only crop cultivation, but also livestock rearing, apiculture, floriculture, sericulture and fishery necessitate to invest in this sector and increase the access of real farmers to such investment. It is imperative to amend the policy, implementation and institutional shortcomings of the subsidy loan program and continue to invest in small and medium agri-businesses and enterprises thereby improving production, promoting employment and ensuring the food security of the country.

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ANNEXES

Annex I

"Analyzing the Effectiveness of Subsidy Loan Programs to Boost Agricultural Productivity"

Hello and Namaste. My name is …… I am here today for the for the study entitled "Analyzing the Effectiveness of Subsidy Loan Programs to Boost Agricultural Productivity" being carried out Mr. Anupam Uprety, DNPPF, 2022 under the supervision of National Planning Commission, Nepal. All the information received hereby will be kept secret as per Nepal Statistics Act, 2015 and will not be used for any other purpose except this study.

Qualitative tool

Key informant interview

Respondents (Programs makers, institutional heads)

Name of Respondent-
Organization-
Designation-

S.N.	Category	Major questions
1.	Context	What sorts of and how following context affects the implementation and achievements of objectives of agriculture subsidy loan? • Political • Economic • Social • Technical Pros/cons of these context to achieve goals and objectives of this programs.
2.	Relevance	What are the relevance of subsidy loan programs in global and Nepal contest? Are our BFIs capable to operate as per the guidelines of this programs? What group of farmers are the beneficiaries (prioritized) of this programs? In what ways the programs affect the targeted group?

		Is this programs a need to beneficiaries in today's time and are they benefiting in reality? What issues of farmers are addressed by this agriculture subsidy loan programs? What issues of farmers are not addressed by this programs?
3.	Efficiency	Do you think the benefits outweigh the cost of agriculture subsidy loan? Are available financial resources (Human and banking resources) enough to implement this programs? What's your say on the use of procured subsidized loan? Are beneficiaries capable of utilizing the fund as per the intensions of government?
4.	Effectiveness	To what extent the program has solved the context of credit dearth in agriculture? What proportion of farmers are benefiting from this programs? Is the number satisfactory? Is the program inclusive fairly across farming community?
5.	Sustainability	What practices should be continued to achieve prospective outcomes? What are malpractices that might hamper the sustainability of this programs? What measures are undertaken to sustain this programs?
6.	Challenges	What are the challenges faced so far in implementation of subsidy loan programs? What sorts of hurdle might appear in days to come to continue such program?
7.	Lesson learned	What initiatives are undertaken to counter appeared challenges of this program? What sorts of resources (human and financial) are forged to confront such challenges?
8.	Recommendation	Please provide your recommendation on this program……..

Annex II

Questionnaire I: For Subsidized Loan User

Hello and Namaste. My name is …… I am here today for the for the study entitled "Analyzing the Effectiveness of Subsidy Loan Programs to Boost Agricultural Productivity" being carried out Mr. Anupam Uprety, DNPPF, 2022 under the supervision of National Planning Commission, Nepal. All the information received hereby will be kept secret as per Nepal Statistics Act, 2015 and will not be used for any other purpose except this study.

A1. Basic information

Code	Information	Response
A101	Date of interview (mm/dd/yyyy)	
A102	Address of respondent	
A103	Farmer's phone number	
A104	Name of the respondent	------ ------- -------

A2. Household characteristics

Code	**Variables**	Response
A201		
A202		
A203	Is the respondent household head?	☐ 1= Yes ☐ 2= No
A204	If No, name of household head	
A205	Age of the HH	…… years
A206	Gender of HH	☐ 1= Male ☐ 2= Female ☐ 3=other
A207	Years of schooling of HH	…… years
A208	Farming experience of HH	…… years
A209	Is the head of the household major farmer in the family?	☐ 1= Yes ☐ 2= No
A210	If No, name of the major farmer	
A211	Gender of the major farmers	☐ 1= Male ☐ 2= Female
A212	Education of major farmer	…… years of schooling
A213	Farming experience of major farming	…… years
A214	Household size (# of people sharing the same kitchen in the past 6 months)	……. Persons
A215	No. of economically active male members (15-60 years)	…….. Persons

A216	No. of female members (15-60 years)	…….. Persons
A217	No. of male members (<15 and >60 years)	…….. Persons
A218	No. of female members (<15 and >60 years)	…….. Persons
A219	No. of family members on non-farm jobs	
A220	Member of institutions (farmers' group, cooperatives,)	☐ 1= Yes ☐ 2= No
A221	Total family income (annual)	
A222	Family income from agriculture/livestock	

B1. Recipient of agriculture subsidized loan

B101. Have you taken agricultural subsidized loan from NRB licensed banks and financial institutions?

☐ 1= Yes ☐ 2= No

B102a. How was the agricultural subsidized loan taken?

☐ 1= With Mortgage ☐ 2= Without Mortgage

B102b. If with Mortgage, what property was kept as Mortgage?

☐ 1= Cultivated land ☐ 2= Uncultivated land ☐ 3= House/Infrastructures ☐ 4= Valuable accessories (gold/silver) ☐ 5= Others

B102bi. If others, please specify ……..

B103. What is the category of BFIs that provided agricultural subsidized loan?

☐ A ☐ B ☐ C ☐ D

B104. How much interest rate are you paying for subsidized loan?

…… % per annum.

B105. Have you obtained sufficient credit as per your demand from subsidized loan program?

☐ 1= Yes ☐ 2= No

B106. What percent of your credit demand was fulfilled by the loan taken from BFIs?

About ….. Percent.

B107. How easy do you realize to obtain agriculture subsidized loan from BFIs?

☐ 1= Very Easy ☐ 2= Easy ☐ 3= Moderate ☐ 4= Difficult ☐ 5= Very Difficult

B108. What are the difficulties you faced procuring agriculture subsidized loan?

☐ 1= Lengthy procedure

☐ 2= Lot of paper works

☐ 3= Inadequate or difficult to manage mortgage

☐ 4= Corrupt bank bureaucracy

☐ 5= ignorance by BFIs

☐ 6= Lack of access to BFIs

B109a. Have you invested the procured subsidized loan for purposes other than agriculture?

☐ 1= Yes ☐ 2= No

B109b. If yes, for what purposes?

☐ 1= Household Consumption

☐ 2= Education

☐ 3= Health

☐ 4= Capital Purchase

☐ 5= Out sanding loan

☐ 6= Abroad job/enrollment

B109c. What percent of subsidized loan was used for purposes other than agriculture?

About ….. Percent.

C. Land Characteristics

C101. How many land plots are under your care? …… (Number)

C102. Land Ownership (Ropani)

Plot No.	Owned			Rented			Distance from nearby road (meters)	Land status		Year round irrigation status (1=Yes, 0= No)	If used as mortgage 1= Yes 2= No
	Khet	Bari	Others	Khet	Bari	Others		Cultivated	Uncultivated		
	C102	C103	C104	C105	C106	C107	C108	C109	C110	C111	C112
1.											
2.											
3.											
4.											
5.											
6.											
7.											

D. Livestock holding

D101.	Does your household own any livestock in the past growing season?		☐ 1= Yes , ☐ 2= No **[If No, Skip to E**]							
D102.	If **YES**, indicate the type and number of livestock your household owns and their intended use (i.e., for home consumption (milk/eggs/meat/manure) cultivation and transport, and sale.									
Livestock type	Code	Total number	Estimated value of livestock products used for home consumption last year		Value of livestock animals used for draft or transportation	Value of farmyard manure used last year	Income from sale of livestock products	Number sold last year	Gross income from livestock in the last season (Rs)	Amount of subsidized loan used for livestock procurement (NRs.)
			Meat (*Rs)*	Milk/Eggs (*Rs*)	Approximate value in Rs.	Approximate value in (Rs)	Approximate value in Rs	Approx value in Rs		
		D102	D103	D104	D105	D106	D107	D108	D109	D110
Cattle	01									
Pigs	02									
Goats	03									
Sheep	04									
Rabbits	05									
Ducks	06									
Chickens/poultry	07									
Other (Specify)	08									

E. Food production and marketing

Did you grow this crop in the last 12 months? If yes, complete the row.	Code	1= Yes 2= No	Cultivated area size (ropani)	Total production (Kg)	Amount of seed used (Kg)	Amount of fertilizer used (Kg)	Amount of labor (Man days)	Irrigation and capital expenditure (Rs)	Amount of subsidized loan used for food production (NRs.)
		E101	E102	E103	E104	E105	E106	E107	E108
Rice	01								
Maize	02								
Wheat	03								
Barley	04								
Barely	05								
Buckwheat	06								
Millet	07								
Other (specify).....	08								

F. Vegetable production and marketing

Did you grow this vegetable in the last 12 months? If yes, complete the row.	Code	1= Yes 2= No	Cultivated area size (ropani)	Total production (Kg)	Amount of seed used (Kg)	Amount of fertilizer used (Kg)	Amount of labor (Man days)	Irrigation and capital expenditure (Rs)	Amount of subsidized loan used for vegetable production (NRs.)
		F101	F102	F103	F104	F105	F106	F107	F108
Tomato	01								
Cauliflower	02								
Cabbage	03								
Broad mustard leaf	04								
Bean	05								
Potato	06								
Cucumber	07								
Bitter Gourds	08								
Pumpkins	09								
Lady's finger	10								
Onion/garlic	11								
Other gourds	12								
Egg plants/brinjal	13								
Others (specify……)	14								

G. Farm assets and uses

Does your farm have following assets**?**	Code	1= Yes 2= No	Number of equipment	If purchased after subsidized loan received? 1= Yes 2= No	Amount of subsidized loan used for purchasing farm asset (NRs.)	If No, have you used them by some other means?
		G101	G101	G101	G101	G101
Tractor/Mini tillers	01					
Water pump	02					
Sprayer	03					
Automobiles	04					
Threshing machine/maize shell thresher	05					
Cultivator	06					
Storage structures for surplus farm products/farm assets (coldbot, refrigerators, zero-energy storage, assets storage house)	07					
Local agri-tools	08					

H. What are the agriculture technologies you have adopted after receiving subsidized loan?

Agriculture technologies	Code	Adopted 1= Yes 2= No	Description of technology	Quantity (if applicable)	Year of adoption	Amount of subsidized loan used for technology adoption (NRs.)
		H101	H102	H103	H104	H105
Farm mechanization	01					

Specialized agriculture practices (Organic, conservation, permaculture, hydroponics, aeroponics, CSA)	02					
Improved seed technology	03					
Protected cultivation (plastic house, green house, net house)	04					
Land improvement (SALT, Land expansion, landslide resistant, irrigation and drainage system, increase organic contents,)	05					
Storage and processing house	06					

Annex III

Questionnaire I: For Subsidized Loan Non-User

This questionnaire has been prepared for the study entitled "Analyzing the Effectiveness of Subsidy Loan Programs to Boost Agricultural Productivity" being carried out Mr. Anupam Uprety, DNPPF, 2022 under the supervision of National Planning Commission, Nepal. All the information received hereby will be kept secret as per Nepal Statistics Act, 2015 and will not be used for any other purpose except this study.

A1. Basic information

Code	Information	Response
A101	Interviewer's code	
A102	Date of interview (mm/dd/yyyy)	
A103	Districts	
A104	Farmer's phone number	------ ------- -------

A2. Household characteristics

Code	**Variables**	Response
A201	ID number of respondent	
A202	Name of the respondent	
A203	Is the respondent household head?	☐ 1= Yes ☐ 2= No
A204	If No, name of household head	
A205	Age of the HH	…… years
A206	Gender of HH	☐ 1= Male ☐ 2= Female ☐ 3=other
A207	Years of schooling of HH	…… years
A208	Farming experience of HH	…… years

A209	Is the head of the household major farmer in the family?	☐ 1= Yes ☐ 2= No
A210	If No, name of the major farmer	
A211	Gender of the major farmers	☐ 1= Male ☐ 2= Female
A212	Education of major farmer	…… years of schooling
A213	Farming experience of major farming	…… years
A214	Household size (# of people sharing the same kitchen in the past 6 months)	……. Persons
A215	No. of male members (15-60 years)	…….. Persons
A216	No. of female members (15-60 years)	…….. Persons
A217	No. of male members (<15 and >60 years)	…….. Persons
A218	No. of female members (<15 and >60 years)	…….. Persons
A219	No. of family members on non-farm jobs	
A220	Member of institutions (farmers' group, cooperatives,)	☐ 1= Yes ☐ 2= No
A221	Total family income (annual)	
A222	Family income from agriculture/livestock	

B1. Information on agriculture subsidized loan

B101. Do you know about agricultural subsidized loan provided from NRB licensed banks and financial institutions?

☐ 1= Yes ☐ 2= No

B102a. Have you ever applied for agricultural subsidized loan?

☐ 1= Yes ☐ 2= No

B102b. If yes, to what category of BFIs have you applied agricultural subsidized loan?

☐ A ☐ B ☐ C ☐ D

B102c. How easy do you think is it to obtain agriculture subsidized loan from BFIs?

☐ 1= Very Easy ☐ 2= Easy ☐ 3= Moderate ☐ 4= Difficult ☐ 5= Very Difficult

B102d. What might be the possible difficulties for procuring agriculture subsidized loan?

☐ 1= Lengthy procedure

☐ 2= Lot of paper works

☐ 3= Inadequate or difficult to manage mortgage

☐ 4= Corrupt bank bureaucracy

☐ 5= ignorance by BFIs

☐ 6= Lack of access to BFIs

B103a. Have you ever procured loan for agriculture?

☐ 1= Yes ☐ 2= No

B103b. If yes, what are the sources of loan?

☐ 1= Friends and relatives

☐ 2= Farmers' group

☐ 3= Landlords

☐ 4= Microfinance and cooperatives (informal/ semi-formal)

☐ 5= Self-help group

B103c. How much interest rate are you paying on an average for such loan?

…… % per annum.

C. Land Characteristics

C101. How many land plots are under your care? …… (Number)

C102. Land Ownership (Ropani)

Plot No.	Owned			Rented			Distance from nearby road (meters)	Land status		Year round irrigation status (1=Yes, 0= No)
	Khet	Bari	Others	Khet	Bari	Others		Cultivated	Uncultivated	
	C102	C103	C104	C105	C106	C107	C108	C109	C110	C111
1.										
2.										
3.										
4.										
5.										
6.										
7.										

D. Livestock holding

D101.	Does your household own any livestock in the past growing season?	☐ 1= Yes , ☐ 2= No **[If No, Skip to E**]

D102.	If **YES**, indicate the type and number of livestock your household owns and their intended use (i.e., for home consumption (milk/eggs/meat/manure) cultivation and transport, and sale.							
Livestock type	Code	Total number	Estimated value of livestock products used for home	Value of livestock animals used for draft or	Value of farmyard manure	Income from sale of livestock products	Number sold last year	Gross income from livestoc

			consumption last year		transportation	used last year			k in the last season (Rs)
			Meat (*Rs)*	Milk/Eggs (*Rs*)	Approximate value in Rs.	Approximate value in (Rs)	Approximate value in Rs	Approx value in Rs	
		D102	D103	D104	D105	D106	D107	D108	D109
Cattle	01								
Pigs	02								
Goats	03								
Sheep	04								
Rabbits	05								
Ducks	06								
Chickens/poultry	07								
Other (Specify)	08								

E. Food production and marketing

Did you grow this crop in the last 12 months? If yes, complete the row.	Code	1= Yes 2= No	Cultivated area size (ropani)	Total production (Kg)	Amount of seed used (Kg)	Amount of fertilizer used (Kg)	Amount of labor (Man days)	Irrigation and capital expenditure (Rs)
		E101	E102	E103	E104	E105	E106	E107
Rice	01							
Maize	02							
Wheat	03							
Barley	04							

Did you grow this crop in the last 12 months? If yes, complete the row.	Code	1= Yes 2= No	Cultivated area size (ropani)	Total production (Kg)	Amount of seed used (Kg)	Amount of fertilizer used (Kg)	Amount of labor (Man days)	Irrigation and capital expenditure (Rs)
		E101	E102	E103	E104	E105	E106	E107
Barely	05							
Buckwheat	06							
Millet	07							
Other (specify).....	08							

F. Vegetable production and marketing

Did you grow this vegetable in the last 12 months? If yes, complete the row.	Code	1= Yes 2= No	Cultivated area size (ropani)	Total production (Kg)	Amount of seed used (Kg)	Amount of fertilizer used (Kg)	Amount of labor (Man days)	Irrigation and capital expenditure (Rs)
		F101	F102	F103	F104	F105	F106	F107
Potato	01							
Tomato	02							
Chilies	03							
Onion	04							
Garlic	05							
Green peppers	06							
Green peas	07							
Leafy vegetables	08							
Lettuce	09							

Did you grow this vegetable in the last 12 months? If yes, complete the row.	Code	1= Yes 2= No	Cultivated area size (ropani)	Total production (Kg)	Amount of seed used (Kg)	Amount of fertilizer used (Kg)	Amount of labor (Man days)	Irrigation and capital expenditure (Rs)
		F101	F102	F103	F104	F105	F106	F107
Cauliflower	10							
Mustard/rapeseed	11							
Cabbage	12							
Egg plants	13							
Others (specify……)	14							

G. Farm assets and uses

Does your farm have following assets**?**	Code	1= Yes 2= No	Number of equipment	If No, have you used them by some other means?
		G101	G101	G101
Tractor/Mini tillers	01			

Does your farm have following assets**?**	Code	1= Yes 2= No	Number of equipment	If No, have you used them by some other means?
		G101	G101	G101
Water pump	02			
Sprayer	03			
Automobiles	04			
Threshing machine	05			
Cultivator	06			
Storage structures for surplus farm products/farm assets	07			
Local agri-tools	08			

H. What are the agriculture technologies you have adopted after receiving subsidized loan?

Agriculture technologies	Code	Adopted 1= Yes 2= No	Description of technology	Quantity (if applicable)	Year of adoption
		H101	H102	H103	H104
Farm mechanization	01				
Specialized agriculture practices (Organic, conservation, permaculture, hydroponics, aeroponics, CSA)	02				
Improved seed technology	03				
Protected cultivation (plastic house, green house, net house)	04				

Land improvement (SALT, Land expansion)	05				
Storage and processing house	06				