



THE ANNUAL OUTCOME SURVEY REPORT 2023



**COMMERCIAL AGRICULTURE
AND RESILIENT LIVELIHOODS
ENHANCEMENT
PROGRAMME (CARLEP)-IFAD**

TABLE OF CONTENTS

LIST OF TABLES.....	iii
LIST OF FIGURES.....	v
ABBREVIATIONS.....	vi
EXECUTIVE SUMMARY	vii
CHAPTER 1: Background	1
1.1 Commercial Agriculture and Resilient Livelihoods Enhancement Programme.....	1
1.2 Annual Outcome Survey (AOS)	1
1.3 Scope of the Assignment.....	2
1.4 The Objectives.....	2
CHAPTER 2: Methodology	3
2.1 Technical Approach.....	3
2.2 Launching of the Annual Survey 2023.....	3
2.3 Indicators for monitoring the impact of project	3
2.4 Study Area.....	4
2.5. Sampling	4
2.6 Training of Enumerators	5
2.7 Pre-testing the Survey Instruments.....	5
2.8 Data Quality Control.....	5
2.10 Data Collection; Field Works	6
CHAPTER 3: Results and Discussion.....	7
3.1 Demographic Profile- (Literacy Rate, Age and Gender)	7
3.2 Household Income and Expenditure.....	8
3.2.1 Household Income (Dzongkhag Wise)	10
3.3 Loans Availed by Households.....	11
3.3.1 Purposes of Availing Loans.....	12
3.4 Food Self-Sufficiency Status	13
3.5 Land Use	15
3.6 Area and Production of Vegetables.....	16
3.7 Cattle Ownership	18
3.7.1 Milk Production.....	19
3.8 Adoption of Crops and Livestock Production Technologies.....	21
3.9 Production of Improved Fodder.....	23
3.10 Cattle Shed in Programme Areas.....	25
3.11 Marketing of Agriculture and Livestock Produce	26
3.11.1 Marketing and Markets of Vegetables.....	26
3.11.2 Marketing and Markets of Dairy Product.....	27
3.12 Biogas Promotion.....	28
3.12.1 Trends in Use of Other Energy Sources After the Biogas Installation	29
3.12.2 Energy Sources for Cooking before Biogas Installation	30
3.12.3 Technical Problems on Use of Biogas	31
3.13 Irrigation Infrastructure.....	32
3.13.1 Irrigation Infrastructure	33
3.13.2 Type of Irrigation System used for Vegetable Production.....	35

3.14 Operation of Farm Machinery	36
3.15 Household Involvement in Project Activities	36
3.15.1 Involvement of Households in Other Project Activities	39
3.16 Satisfaction Ratings by Households on Project Implemented Activities	40
3.17 Major Problems Faced by Households	41
3.19 Key Informant Interviews.....	48
3.19.1. Threlphoog Tshogpa, Chimi Rinzin.....	48
3.19.2. Aggregators or traders or middle men	49
3.19.3. Gewog Administrative Officer.....	50
3.19.4. Gewog Administration, Mongar Dzongkhag.	51
3.19.5. Mangmi (Sonam Lhaden), Tsakaling Gewog.....	52
3.19.6. Mangmi.....	55
3.19.7. Kharphu Tshogpa Kinzang Choden).....	56
3.19.8. Agriculture Aggregator.....	57
3.19.9. Aggregators	58
3.19.10. Lhuentse (DLO)	59
3.19.11. Trashigang (Deputy Chief DLO).....	60
3.19.12. Lhuentse (DAO)	60
3.20 Focus Group Discussion.	62
3.20.1. Zordoong Jersey Gongphel Tshogpa under Kangpar Gewog.	62
3.20.2. Khurichilo Chirphen Tshogpa.....	62
3.20.3 Wamrong Vegetable Group.....	63
3.20.4. Ngatshang Gonor Detshen	64
3.20.5. Khengzor Tshesay Detsen	66
3.20.6. Chali Vegetable Group.....	67
3.20.7. Thamnangbi Om Tshongdril Namlay Tshokdey	68
3.20.8. Takchu Sanam Nyamrub Detshen. (Vegetable Group).....	70
3.20.9. Kedhikhar Sanam Nyamrub Detshen. (Women Group).....	71
CHAPTER 4: ANNEXURES.....	73
4.1 Checklist for Key Informant Interviews and Focus Group Discussion	73
4.2 Annual Outcome Survey (2023) Questionnaire	77

LIST OF TABLES

Table 1: Household Composition and Gender	7
Table 2: Age of the Respondents.....	7
Table 3: Literacy Level of the Respondents	8
Table 4: Average Household Income and Income Sources	8
Table 5: Average Annual Expenditure and Areas of Expenses Incurred.....	9
Table 6: Average Annual Income per Household (Dzongkhag wise).....	11
Table 7: Average Loan Availed per Household.....	11
Table 8: Purposes of Availing Loans.....	12
Table 9: Food Self-Sufficiency Status.....	14
Table 10: Dzongkhags and Gewogs Facing Food Shortage	14
Table 11: Land Use and Land Holding of the Households.....	15
Table 12: Vegetable Production and Production Area.....	16
Table 13: Quantity of Vegetables Produced, Sold and Income Earned	17
Table 14: Cattle Ownership by the Households.....	18
Table 15: Milk Production by Improved Cattle and Local Cattle.....	19
Table 16: Agriculture Production Technologies Adopted by the HHs.....	21
Table 17: Types of Livestock Production Technology Adopted by the HHs	22
Table 18: Areas under Improved Fodder and Winter Fodder Cultivation.....	24
Table 19: HHs owning Different Types of Cattle Shed.....	26
Table 20: Marketing of Vegetable.....	26
Table 21: Top Three Markets for Marketing Vegetables.....	27
Table 22: Marketing Strategy in Marketing Dairy Products.....	27
Table 23: Top Three Markets for Dairy Produce Marketing.....	28
Table 24: Marketing Agents and its Impact on Market Accessibility	28
Table 25: Biogas Ownership and Average Daily Usage by the Dzongkhags.....	28
Table 26: Energy Sources for Cooking Before Biogas Installation	30
Table 27: Household Responses on Issues Related to Biogas.....	31
Table 28: Technical Problems Reported by Households (HHs) Using Biogas.....	31
Table 29: Irrigation Facility Availed by HHs	32
Table 30: Households Reporting Irrigation Support from CARLEP for Wetland Agriculture	33
Table 31: Trends in Cultivation Area and HHs Involved in Post-Harvest Paddy Cultivation	34
Table 32: Gender Involvement in Operating Farm Machineries and Equipment	36
Table 33: Dzongkhag-Wise Display of HHs Involved in Different Project Activities in 2023	37

Table 34: Involvement of Households in Project Activities.....	37
Table 35: Household Involvement in Other Project Activities (Other than CARLEP)	39
Table 36: Various Type of Support Received by the HHs.....	39
Table 37: Satisfaction Ratings by Households on Project Implemented Activities.....	41
Table 38: Number One Major Problem Faced by HHs.	41
Table 39: Second Major Problem Faced by the HHs	43
Table 40: List of Third Major Problems Faced by the HHs.	43

LIST OF FIGURES

Figure 1: Sample area and sample plots.....	4
Figure 2: Average milk production per household per day by improved breed of cattle	20
Figure 3: Average milk production per household per day by improved breed of cattle	20
Figure 4: Number of new agriculture production technology supports adopted by the HHs.....	22
Figure 5: Number of livestock production technology adopted by the HHs.....	23
Figure 6: Percentage of areas under improved fodder cultivation in sample population.....	25
Figure 7: Percentage of areas under winter fodder cultivation in sample population	25
Figure 8: Percentage of HHs using biogas for varying time ranges	29
Figure 9: Trends in use of other energy sources after biogas installation	30
Figure 10: Percentage of HHs impacted by Irrigation Infrastructure in curbing the farm water shortage.....	33
Figure 11: Status of productivity over the last three years after intervention in irrigation infrastructure	35
Figure 12: Number of HHs using different irrigation system	35
Figure 13: Percentage of frequency of support received by beneficiary HHs.....	38
Figure 14: Number of HHs cultivating vegetables in paddy after harvest.....	40
Figure 15: Gender participation over the years.....	45
Figure 16: Literacy level of the respondents over the years.....	45
Figure 17: Monthly average income and expenditure of the HHs over the years	46
Figure 18: Food self-sufficiency status over the years	46
Figure 19: Percentage of HHs involved vegetable cultivation over the years	47

ABBREVIATIONS

AOS	Annual Outcome Survey
ARDC	Agriculture Research and Development Center
CARLEP	Commercial Agriculture and Resilient Livelihoods Enhancement Programme
F2F	Farmers to Farmers
FAO	Food and Agriculture Organization
FG	Farmer's Group
FGD	Focus Group Discussion
FY	Fiscal Year
Ha	Hectare
HH	Household
HSS	Higher Secondary School
IFAD	International Fund for Agriculture Development
Kg	Kilogram
KII	Key Informant Interview
KIL	Kofouko International Limited
KM	Kilometer
LG	Local Government
MCC	Milk Collection Center
MPU	Milk Processing Unit
MSS	Middle Secondary School
N	Total Number of Units
n	Number of Units
NFE	Non Formal Education
Nu	Ngultrum
NWFP	Non Wood Forest Products
OPM	Office of Programme Management
<i>p</i>	Significant Value of Statistical Test
RAMCO	Regional Agriculture Marketing and Cooperative Office
RLDC	Regional Livestock Development Center
ToR	Terms of Reference

EXECUTIVE SUMMARY

1. The 57% (n=114) of respondents from the households were female, while males accounted for 43% (n=86).
2. The heads of households were predominantly male, comprising 55%, compared to 45% female.
3. The 42% of respondents were found to be illiterate. 7% attended monastic school, 31.5% participated in non-formal education and 19% received formal education.
4. The 40% (n=46) of women were illiterate compared to 44% (n=38) in men.
5. The average monthly income of the household was Nu. 14,987.4, resulting in an annual household income of Nu. 179,849.2.
6. Remittances, salary and wages were the top three income source for the households of the sample population.
7. Apart from wages salary and remittances, rural smallholders earned a sum of Nu. 38,940.1 and 38,964 from agriculture and livestock activities respectively.
8. The average annual expenditure per household is Nu. 189,110.5, which translates to a monthly average of Nu. 15,759.2.
9. The highest average expenditure was reported in the field of Social Welfare with Nu. 56,333.3, reported by three households.
10. Approximately 17.6% of the total respondents availed loan purely for agriculture and livestock purposes.
11. Majority of the households obtained loan for the fencing of agricultural fields, followed by procurement of farm machinery and the initiation of piggery, fishery, and poultry projects.
12. Approximately 98.5% (n=197) in the region were food secure for the last 12 months.
13. Approximately 1.5% (n=3) reported experienced food shortages and nevertheless, these households have shown an improvement in their food self-sufficiency status over the past year.
14. The land use in the region is predominantly characterized by dryland, comprising 91.2% of the total with an acreage of 843.1 acres followed by wetland.
15. Approximately 43% of the dryland is categorized as fallow.
16. The average dryland holding per household is 4.2 acres, while the average wetland holding per household is 0.4 acres.
17. Overall, the mean landholding size per household is 2.3 acres.
18. 100 % of the households reported involved in cultivation of vegetables, covering a total area of 68.07 acres.
19. The total quantity of vegetables produced by the households was 115,308 kg, of which 69,424 kg were sold, garnering a total income of Nu. 3,677,685.
20. On an average, each household produced 10,482.55 kg of vegetables, sold 6,311.27 kg, and earned Nu. 334,335. Chili was the main cash crop.
21. Approximately 90.5% of the households reported engaged in rearing livestock.
22. On an average, the cattle population is evenly distributed between improved and local breeds, with each breed constituting 50% of the total cattle population in the sampled gewogs.
23. Approximately 21.9% of households reported adoption of sprinkle irrigation technology followed by Greenhouse and Poly-tunnels.
24. 22.6% of the responding households reported adoption of Improved Fodder Grass Plantation followed by Winter Fodder Cultivation.

25. Apparently 39.52 acres of the land was reported being utilized for improved fodder cultivation and 17.89 acres under winter fodder cultivation.
26. On an average, the area under improved fodder grass cultivation per household is 0.19 acres, while winter fodder cultivation averages 0.08 acres per household.
27. Overall, 81.75% of the surveyed households have access to improved cattle sheds.
28. The 34.80% of the households reported to have cattle sheds equipped with concrete floors, CGI roofing, mangers, and troughs.
29. Approximately 64.5% of the households reported engaged in selling vegetables.
30. 17.82% (n=23) of households were known to market their produce in groups, while 82.17% (n=106) sell their vegetables individually.
31. Approximately 34.8% of households preferred local markets as their number one market to selling their vegetables and dairy products.
32. The 40.98% (n=50) of the households responded to marketing their dairy products in groups, whereas 59.01% (n=72) market individually.
33. 28 number of the households reported the prevalence traders or persons buying in bulk, with 96.4% reporting improvement in their accessibility to markets with this arrangement.
34. A total of 51 households (25.5%) reported to use biogas and 49% of the biogas users reported using biogas for 30 minutes to 1 hour.
35. 52.94%, (n=27) of households using biogas reported that no technical issues were prevalent.
36. 29.5% (n=59) of the households received support in the irrigation infrastructure and 56% of the households receiving irrigation aid reported significant reduction in the farm water shortage.
37. 28 households (14%) reported an increase in the cultivated area and 25 households (12.5%) observed an increase in paddy productivity. The total increase in cultivated land area over the past three years amounted to 18.411 acres.
38. The highest prevalence of joint operation by both male and female members is observed in the use of chaff cutters (63.8%) and dairy equipment (56.7%).
39. There is significant female participation in operating dairy equipment (20.5%).
40. 93% of the households reported involved in different project activities supported by CARLEP. 155 households (77.5%) were found not involved in the any other project activities other than CARLEP.
41. 56.6% of the households reported being highly satisfied with the implemented project activities.
42. Human wildlife conflict was the major problem faced by the households of the sample population.

CHAPTER 1: Background

1.1 Commercial Agriculture and Resilient Livelihoods Enhancement Programme

The Commercial Agriculture and Resilient Livelihoods Enhancement Programme (CARLEP) funded through International Fund for Agricultural Development (IFAD) aims to facilitate the transformation of a subsistence-based rural agricultural economy into a sustainable value chain and market driven productive sector by promoting climate informed approaches in agriculture and strengthening capacities of communities and local institutions. The Project was started in December 2015 and premeditated to complete in December 2022. In 2019 additional finance was approved and the completion date has been extended to December 2025. The revised budget allocation for the project is US\$ 25.6 million. The programme aims to support 28,975 households in Lhuentse, Mongar, Pemagatshel, Samdrup Jongkhar, Trashigang and Trashiyangtse Dzongkhags. Its goal is to sustainably increase smallholder income and reduce poverty through commercialization of production. The objective is to increase returns to smallholder farmers through climate-resilient production of crops and livestock products in nationally organized value chains and marketing systems. The two prong approaches are commercialization of vegetable value chain and Dairy Value Chain with climate resilient promotion in the programme area. The programme has focused on increased agricultural production and makes a basic shift in approach towards marketing and climate resilient farming practices. Its goal is to sustainably increase smallholder farmers' income and reduce rural poverty.

1.2 Annual Outcome Survey (AOS)

As a part of monitoring the performance of the project, the AOS will also evaluate outcome and impact of project activities. The AOS sets out to identify positive and negative changes at the household level to highlight evidence of where the project is achieving results and where it is lagging behind and to draw on the findings for designing corrective actions. AOS provides the opportunity to gather information on a large number of indicators and to compare these data from previous years. Also, it can be adjusted to measure the same layers of indicators with different target groups. The survey is conducted in villages randomly selected by the project providing a basis for outcome and impact analysis. The survey is undertaken in conjunction with qualitative assessments that would complement the household-level data, providing information on 'why' and 'how' some outcomes were or were not achieved. To generate such data, in addition to the household interviews, the focus group discussions and key informant interviews are conducted in parallel. The task of conducting the

AOS for the year 2023 has been awarded to the respective extension officers in the randomly sampled gewogs.

1.3 Scope of the Assignment

The annual outcome survey is expected to evaluate the outcome and impact of the project activities at the household and community level highlighting both the positive and negative changes as compared to the previous years and indicate differential impacts among the beneficiaries. The main task is to conduct the annual outcome survey for the year 2023 and submit a report to the Office of the Programme Management. The household survey is designed to collect both quantitative and qualitative data through household interviews using structured questionnaires and through Key Informant Interviews (KII).

1.4 The Objectives

The objectives of the assignment for the AOS are to collect quantitative and qualitative data for the year 2023 for the Project CARLEP was specifically, to

- Document the changes happening at the households (HHs) level in terms of livelihoods, food security, and female participation in project activities; and market access during the project cycle.
- Provide timely information necessary to undertake corrective actions and plan interventions.
- Provide information and definitive pathways for planning an effectual strategy and operation models for better results and outcomes and more efficient use of resources.

CHAPTER 2: Methodology

2.1 Technical Approach

The annual outcome survey is expected to provide information on the key performance indicators to enable comparison with the performance in the previous years. In the past, the annual surveys have been completed annually. The present survey is for the year 2023. The household survey is implemented in conjunction with qualitative assessments providing information on ‘why’ and ‘how’ some outcomes were or were not achieved. Therefore, in addition to the household interviews Key Informant Interviews (KIIs) and Focus Group Discussions (FDGs) were conducted.

2.2 Launching of the Annual Survey 2023

As done in the past annual surveys, the framework for annual outcome survey has been designed based on the ‘Technical Guideline Note’ prepared by IFAD. The survey covers both the qualitative and quantitative assessment of major project activities using structured questionnaire, Focus Group Discussion and Key Informant (KI) interviews. This means that in each cluster, in addition to the household interviews, the survey team will conduct one key informant interview and focus group discussion at the very least. The AOS for 2023 was conducted in close coordination with the CARLEP Project Management. The Consulting team was led by Mr. Ugyen Wangdi with support from other team members (GKMO & PSO) who closely work for successful implementation and completion of the assigned task. All the key team members were involved and worked closely in the different phases of the implementation. The survey work was kick started with the preparation and submission of the inception report.

2.3 Indicators for monitoring the impact of project

The indicators used in the past annual surveys as listed below were based on the guidelines prescribed in the IFAD manual for annual outcome surveys.

- Participation in the specific project activities
- Degree of satisfaction with the project
- Women’s participation in development activities
- Household” Income from vegetable and dairy
- Food security and self-sufficiency
- Access to land and other productive natural resources, changes in productivity
- Farming for subsistence and/or sale
- Production trend (crop area and yield, irrigation, dairy)

- Access to market - increase in sales of produce, physical access to market, vegetable and dairy marketing trend.

2.4 Study Area

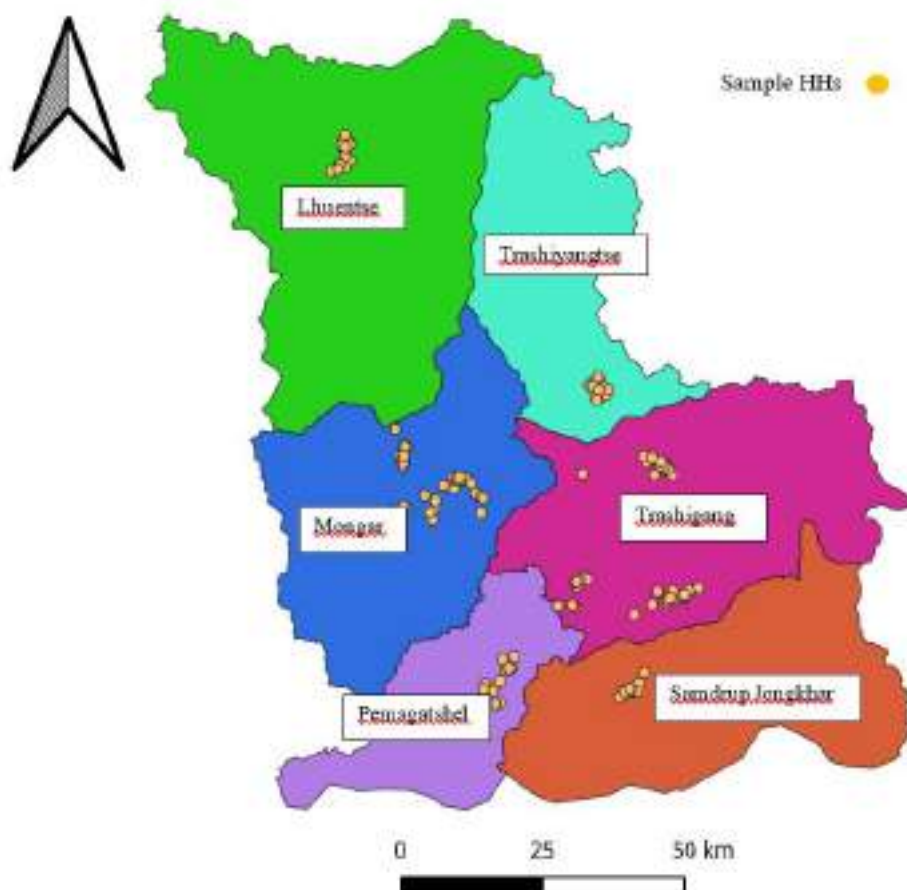


Figure 1: *Sample area and sample plots*

The survey was conducted in 10 gewogs under six Programme dzongkhags covering 200 households. The sampling methodology for surveying the households was Simple Random Sampling.

2.5. Sampling

For this study the population constituted the households of respective selected Gewogs, Key stakeholders- Gups, Tshogpas and others for KII. The population was sampled independently, but the analysis was carried out jointly as well as independently. A total of 200 households were randomly selected using random sampling method as for KII was purposive sampling as per the convenience of the stakeholders. This study will focus both on quantitative (number and other details

of the households- income, gender) indicators or variables and qualitative (socio-economic perspective of the rural communities and its role in livelihood and others). The questionnaire was pre-tested before the survey.

2.6 Training of Enumerators

Two-day training cum induction course for the enumerators and data entry was organized on 27th March, 2024 at Deothjung in Trashigang. The extension officers were trained on the using of Kobo Toolbox during the course of data collection. Resource persons from CARLEP were invited as observers during the conduct of the training. The training included sharing the following information project background pilot and pre-test of questionnaire entering data in google form data manager attended and shared on how to enter data. ethics, gender and disability considerations obtaining informed consent arranging an interview technique (neutrality, interviewee confidence, confidentiality) purpose behind each item included in the questionnaire data recording roles and responsibilities of the field team members quality concerns in the questionnaire enumerators code of conduct

2.7 Pre-testing the Survey Instruments

It is important to pre-test the instruments in the local setting. Prior to traveling to the field for survey data collection the enumerators were trained by pre-testing the questionnaires on the different aspects of the survey in Trashigang. The pre-test was carried out on the last day of the training. As part of the training, a field practice of the survey was organized for the interviewers in Trashigang in consultation with the CARLEP. Smaller groups of 2-3 members and 1 supervisor went for the practice survey. Each group conducted at least two interviews. The supervisor also practiced editing the completed forms. The purpose of the pretest is to help improve field procedures, schedules and questionnaires. In the light of the experiences gained in the pre-tests, all the survey instruments were modified so that the necessary information can be collected in efficient manner at minimum time and cost.

2.8 Data Quality Control

The first level of quality control lies with the interviewers; therefore, adequate training and working in pairs was emphasized to minimize the risk of procedural errors. The second level of control is the field supervisor for each cluster. During data collection, field supervisors were briefed to ensure proper interviewing through daily spot checks during the course of data gathering.

Therefore, the following measures were taken during the data collection period to ensure gathering of valid and reliable data;

2.10 Data Collection; Field Works

KoBo Toolbox App was used for data collection for the household interview, while FGD and KII was recorded on hard copies alongside AI tool namely Otter for recording virtually. KoBo Toolbox is a free and open source suite of tools for field data collection and analysis provided by the Harvard Humanitarian Initiative. The online form was developed using the finalized questionnaire in KoBo Toolbox App. Data can be collected offline and automatically submitted whenever the device is connected to internet.

A comprehensive general and familiarization training on KoBo Toolbox App was provided to the extension officers of the selected gewogs for two days at Deothjung. KoBo Toolbox App was installed in their smart phones. The training was inclusive of classroom and field testing exercise. Standard quantitative interviewing techniques and field protocols were discussed in detail. Finally, every enumerator was fully familiarized with the application of KoBo Toolbox App after several demonstrations.

CHAPTER 3: Results and Discussion

3.1 Demographic Profile- (Literacy Rate, Age and Gender)

In the sample gewogs, the majority of respondents from the households were female, making up 57% of the total, while males accounted for 43%. Despite this, the heads of households were predominantly male, comprising 55%, compared to 45% female.

Table 1: Household Composition and Gender

	Respondents			Head of HH		
	Male	Female	Total	Male	Female	Total
Number	86	114	200	109	91	200
Percentage (%)	43	57	100	55	45	100

The study included a total of 200 participants. 48 individuals were reported aged over 56 years, representing 24% of the total sample. Of these, 22 were female and 26 were male. Additionally, 152 participants were between 18-56 years of age making up 76% of the total sample. Within this group, 92 were female and 60 were male. And there were no participants in this age group of below 18 years. Overall, females accounted for 57% of the sample (114 participants), while males represented 43% (n=86).

Table 2: Age of the Respondents

Age Group	Female	Male	Total	Percent (%)
>56 years	22	26	48	24
18-56 years	92	60	152	76
<18 years	0	0	0	0
Total	114	86	200	100

The literacy levels among the gender-segregated respondents, categorized by type of education, are presented in the table below (**Table 3**). The majority of the respondents (N=200) were found to be illiterate, comprising 42% of the sample. Additionally, 7% attended monastic school, 31.5% participated in non-formal education, 9% received primary education, 5% attained middle secondary

education, 4.5% completed higher secondary education, and 0.5% each graduated from undergraduate and postgraduate studies.

Table 3: Literacy Level of the Respondents

Sl.no.	Education Level	No. of HH (Respondents)			
		Female	Male	Total	Percent (%)
1	Illiterate	46	38	84	42
2	Monastic school	2	12	14	7
3	Non formal education	50	13	63	31.5
4	Primary education	7	11	18	9
5	Middle Secondary	4	6	10	5
6	Higher Secondary	4	5	9	4.5
7	Graduate	0	1	1	0.5
8	Post Graduate	1	0	1	0.5
Total		114	86	200	100

3.2 Household Income and Expenditure

The **Table 4**, details the average annual household income for the sampled population. The average monthly household income (N=200) was Nu. 14,987.4, resulting in an annual household income of Nu. 179,849.2. This represents a significant increase of approximately 17.5% from Nu. 12,753 in 2020, as reported in the Annual Outcome Survey (2022). It is observed that rural smallholders earned sum of Nu. 38,940.1 and 38,964 from agriculture and livestock activities respectively.

Table 4: Average Household Income and Income Sources

Sl.no	Income Sources	Average Annual Income (Nu.)
1	Cash crop sale	11,843.40
2	Sale of cereals	3279.5

3	Enterprise	13,273.70
4	Fruit crops sold	10,237.70
5	Wages earned	32,027.10
6	Dairy Produce sold	23,288.50
7	Others	8369.4
8	Pension	3487.3
9	Sale of vegetables	13,580
10	Salary Earned	20,867.70
11	Livestock activities	15,675.50
12	Remittances received	26,848.90
13	Processed products	2228.6
14	Non wood forest products	1462.3
Annual Average		179,849.20
Monthly Average		14987.4

The table below (**Table 5**), presents the various areas where households (HHs) reported expenses, along with the number of households reporting each type of expense and the average expenditure in Bhutanese Ngultrum (Nu.). The highest average expenditure was reported in the area of Social Welfare (Nu. 56,333.3). Essential food items had the highest number of households reporting expenses (105 households). The average annual expenditure per household is Nu. 189,110.5, which translates to a monthly average of Nu. 15,759.2.

Table 5: Average Annual Expenditure and Areas of Expenses Incurred

	Areas where expenses were incurred	No. of HHs reporting	Average Expenditure (Nu.)
1	Essential food items	105	12,665.60
2	Business	1	3,000

3	Purchase of feeds and fodders	7	15,233.50
4	Purchase of farm inputs and machineries	2	13,937.50
5	Fuel expenses	1	10,000
6	Health expenses	2	3,250
7	House construction	2	9,000
8	Kids shopping	6	6,500
9	Wages for labors	9	6,888.89
10	Loan repayments	1	18,000
11	Social welfare	3	56,333.30
12	Land development	1	10,000
13	Rituals	4	8,500
14	School expenses	41	12,301.71
15	Taxes	3	3,500
16	Not assessed	12	0
Total no. of Households		200	
Annual average (Nu.)		189110.5	
Monthly average (Nu.)		15759.2	

3.2.1 Household Income (Dzongkhag Wise)

The table below (**Table 6**) presents the household incomes by dzongkhag. Pemagatshel exhibits the highest household income level at Nu. 330,606.4, followed by Trashiyangtse at Nu. 240,019.5. The subsequent household income levels are observed in Samdrup Jongkhar, Trashigang, Mongar, and Lhuentse.

Table 6: Average Annual Income per Household (Dzongkhag wise)

Dzongkhags	Total Number of households	Average Annual Income/households (Nu.)
Lhuentse	20	65,725
Mongar	61	153,786.50
Pemagatshel	18	330,606.40
Samdrup jongkhar	20	222,633
Trashigang	61	165,088.60
Trashiyangtse	20	240,019.50

3.3 Loans Availed by Households

The table below (**Table 7**) presents data on loans availed by households for agricultural purposes. In 2023, 17.6% of the sample households in the region obtained loans. Among the 200 sampled households (N=200) from six programme dzongkhags, Mongar Dzongkhag had the highest number of households with 16 households securing loans exclusively for agricultural purposes. However, Pemagatshel Dzongkhag recorded the highest average loan amount per household at Nu. 562,500, with loan amounts ranging from Nu. 50,000 to Nu. 1,000,000.

Table 7: Average Loan Availed per Household

Dzongkhag	No. of HHs Responding and Percentage				Average loan per HH (Nu.)	Range (Loan Amount (Nu.))
	YES	NO	TOTAL	% YES		
Lhuentse	3	17	20	15	185,000	50,000-300,000
Mongar	16	45	61	26.2	283,750	50,000-700,000
Pemagatshel	4	14	18	22.2	562,500	50,000-1,000,000
Samdrup Jongkhar	0	20	20	0	0	0

Trashigang	5	56	61	8.9	196,000	30,000-500,000
Trashiyangtse	2	18	20	10	500,000	500,000
Total	30	170	200	17.6		

3.3.1 Purposes of Availing Loans

The table below (**Table 8**) delineates the various activities for which loans have been availed. These loans were primarily utilized for the acquisition of improved cattle breeds, the establishment of ventures in poultry, fishery, and piggery, orchard development, land enhancement, fencing installation, cultivation of cash crops, procurement of farm machinery, pasture development, and the purchase of agricultural supplies and equipment, along with other related agricultural endeavors. Notably, 28.5% of the loans were obtained for the fencing of agricultural fields, 14.3% each for the acquisition of farm machinery and the initiation of piggery, fishery, and poultry projects, and 11.9% each for the purchase of improved cattle breeds and other agriculture-related activities.

Table 8: Purposes of Availing Loans

	Loan Purpose	Number of HH	%
1	Purchase improved cattle	5	11.9
2	Construct cattle shed	0	0
3	Purchase chaff cutter	0	0
4	Purchase milk can	0	0
5	To start poultry, fishery, piggery, goat farming	6	14.3
6	Mushroom farming	0	0
7	Greenhouse, mesh net and poly tunnels establishment	0	0
8	Construction of Biogas Digester	0	0
9	Purchase of vegetable seeds	0	0
10	Cultivation of cash crops	3	7.1

11	Orchard development	1	2.4
12	Land development	1	2.4
13	Buying farm machineries	6	14.3
14	Farm supplies and equipment, (seeder, fertilizer sprayer)	1	2.3
15	Agri enterprise development	0	0
16	Fencing	12	28.5
17	Purchase of Agri-infrastructure	0	0
18	Pasture development	2	4.8
19	Others	5	11.9
Total		42	100

3.4 Food Self-Sufficiency Status

Table 9 presents the food self-sufficiency status of the surveyed households. Out of a total of 200 households (N=200), 98.5% (n=197) were reported to be self-sufficient in food, while 1.5% (n=3) experienced food shortages. Notably, the households experiencing food shortages reported an average duration of three months. However, these households have shown an improvement in their food self-sufficiency status over the past year. Among the six program dzongkhags, Trashigang reported the highest number of households with food shortages (n=2), followed by Pemagatshel dzongkhag, which reported one household with food shortages.

Table 9: Food Self-Sufficiency Status

Dzongkhag	HHs reporting food self sufficiency	HHs reporting food shortage	No. of months food shortage faced in a year	HHs reported improvement over the year
Lhuentse	20	0	0	0
Mongar	61	0	0	0
Pemagatshel	17	1	3	1
Samdrup jongkhar	20	0	0	0
Trashigang	59	2	3	2
Trashiyangtse	20	0	0	0
Total	197	3		3
Percent	98.5	1.5		1.5

The table below (**Table 10**) details the specific months during which food shortages were reported by households from various gewogs. The majority of the gewogs indicated that food shortages occurred predominantly in the month of February.

Table 10: Dzongkhags and Gewogs Facing Food Shortage

Dzongkhag	Gewog	Months of food shortage
Trashigang	Lumang	December
	Shongphu	February, August

Pemagatshel	Khar	January, February, March
-------------	------	--------------------------------

3.5 Land Use

The table below presents the land use patterns of the households. Within the sample gewogs under the program dzongkhags, land use is predominantly characterized by dryland, comprising 91.2% of the total with an acreage of 843.1 acres. This is followed by wetland, which constitutes 8.8% of the total land use. Of the total dryland, 43% is categorized as fallow. The average dryland holding per household is 4.2 acres, while the average wetland holding per household is 0.4 acres. Overall, the mean landholding size per household is 2.3 acres.

Table 11: Land Use and Land Holding of the Households

Land holdings (Acres)	Household (N=200)	(%)
Dry land under cultivation	481.3	57.1
Fallow Dry land	361.7	43
Total dry land owned	843.1	91.2
Average dry land holding per HH	4.2	
Wet land under cultivation	46.1	56.7
Fallow Wet land	35.2	43.3
Total wet land owned	81.2	8.8
Average wet land holding per HH	0.4	
Total Land (Dry land + wet land)	924.3	
Overall average land holding size	2.3	

3.6 Area and Production of Vegetables

The table below (**Table 12**) presents the area under vegetable cultivation for the sample gewogs. In 2023, all 200 households cultivated vegetables, covering a total area of 68.07 acres. Among the Dzongkhags, Trashigang reported the highest vegetable cultivation area, totaling 28.29 acres, followed by Mongar with 21.24 acres. Additionally, Trashigang exhibited the highest average cultivated area per household at 0.48 acres, followed by Mongar at 0.35 acres.

Table 12: Vegetable Production and Production Area

Dzongkhag	Area under vegetable cultivation excluding winter vegetables grown in paddy fields (Acre)	No. of HHs cultivating	Cultivation Area per HH (Acre)
Lhuentse	5.65	20	0.28
Mongar	21.24	61	0.35
Pemagatshel	4.73	18	0.28
Samdrup Jongkhar	5.3	20	0.26
Trashigang	28.29	61	0.48
Trashiyangtse	2.86	20	0.14
Total	68.07	200	
Overall Area under vegetable cultivation per household (Acres)		0.30	

The table below (**Table 13**) presents data on vegetable cultivation among the 200 households surveyed, detailing the types of vegetables produced, quantities produced and sold, and the income earned. The survey covered 11 key vegetables promoted by the project. The annual production in the year 2023 ranged from 1146 kg of tomatoes to 27133 kg of chilies. The total quantity of vegetables produced by the households was 115,308 kg, of which 69,424 kg were sold, generating a total income of Nu. 3,677,685. On average, each household produced 576.54 kg of vegetables, sold 347.12 kg, and earned Nu. 18,388.4 from just venturing into vegetable production. Among the vegetables listed, chili stands out as the main source of income for the households. It generated the highest income of

Nu. 1,496,350 from a production of 27,133 kg, with 14,606 kg sold. This income is significantly higher compared to the income earned from other vegetables, indicating that chili is the predominant vegetable contributing to the household's earnings.

Table 13: Quantity of Vegetables Produced, Sold and Income Earned

	Types of vegetable	Households (N=200)		
		Quantity Produced (Kg.)	Quantity Sold (Kg.)	Income Earned (Nu.)
1	Carrot	3,957	2,626	86,050
2	Broccoli	13,200	11,072	362,775
3	Tomato	1,146	633	34,100
4	Onion	2,144	420	27,150
5	Cabbage	21,605	14,195	301,540
6	Beans	11,871	6,730	500,340
7	Asparagus	1,867	1,770	73,000
8	Chili	27,133	14,606	1,496,350
9	Peas	3,215	1,640	105,900
10	Cauliflower	6,464	4,301	237,030
11	Others	22,706	11,431	453,450
Total		115,308	69,424	3,677,685
Average		576.54	347.12	18,388.4

***Note: Others = Potatoes, pumpkins, spinach, brinjal, saag, lettuce*

**Asparagus = 1 bundle = 1Kg*

3.7 Cattle Ownership

The **Table 14** provides a comprehensive overview of cattle ownership dynamics within the specified Dzongkhags, highlighting the prevalence of both improved and local breeds and the significant proportion of households engaged in cattle farming. On average, the cattle population is evenly distributed between improved and local breeds, with each breed constituting 50% of the total cattle population in the sampled gewogs within the programme Dzongkhags. Lhuentse exhibits the highest average number of cattle per household, while Mongar (n=60) and Trashigang (n=50) reported the highest number of households owning cattle. Both Samdrup Jongkhar and Lhuentse show the highest proportion of households owning cattle, each at 100%. The data indicates substantial household engagement in cattle farming, underlining its importance for the livelihood of these regions, with 90.5% of households reported as being engaged in cattle farming.

Table 14: Cattle Ownership by the Households

Dzongkhag	Improved Breed owned by HHs	Local Breed owned by HHs	Total cattle owned by HHs	Average number of cattle per HHs	No. of HHs owning cattle	% HHs owning cattle
Lhuentse	46	107	153	7	20	100
Mongar	181	105	286	4	60	98.4
Pemagatshel	23	9	32	2	13	72
Samdrup Jongkhar	36	18	54	2	20	100
Trashigang	124	167	291	5	50	81.9
Trashiyangste	44	48	92	5	18	90
Total	454	454	908		181	
Percent (%)	50	50			90.5	

3.7.1 Milk Production

Table 15 provides a comprehensive overview of milk production across several Dzongkhags, illustrating both the number of households involved in milk production and the seasonal variations in milk yield. Mongar leads with the highest number and percentage of households producing milk, contributing significantly to the overall milk production with 451 liters per day in summer and 297.5 liters per day in winter from improved cattle. Lhuentse and Samdrup Jongkhar have a consistent number of households producing milk, each contributing to a significant portion of milk production from improved breeds. Trashigang also shows a substantial involvement in milk production, particularly with local breeds. Overall, it reflects a strong engagement in milk production activities, with improved breeds contributing more significantly to milk yield compared to local breeds, especially in the summer season. Furthermore, the average milk production per household per day from improved breed of cattle and local breed of cattle in two seasons are given in the **Figure 2** and **Figure 3** respectively.

Table 15: Milk Production by Improved Cattle and Local Cattle

Dzongkhag	No. of HHs producing milk	%	Improved cattle milk production per day (liters)		Local Breed milk production (liters)	
			Summer	Winter	Summer	Winter
Lhuentse	20	11.05	86	72	51	39
Mongar	60	33.15	451	297.5	94	67
Pemagatshel	13	7.18	40	25	10	7
Samdrup Jongkhar	20	11.05	149	98	15	7
Trashigang	50	27.62	111	54.5	57	45
Trashiyangtse	18	9.94	47	34	14	12
Total	181	100	884	581	241	177

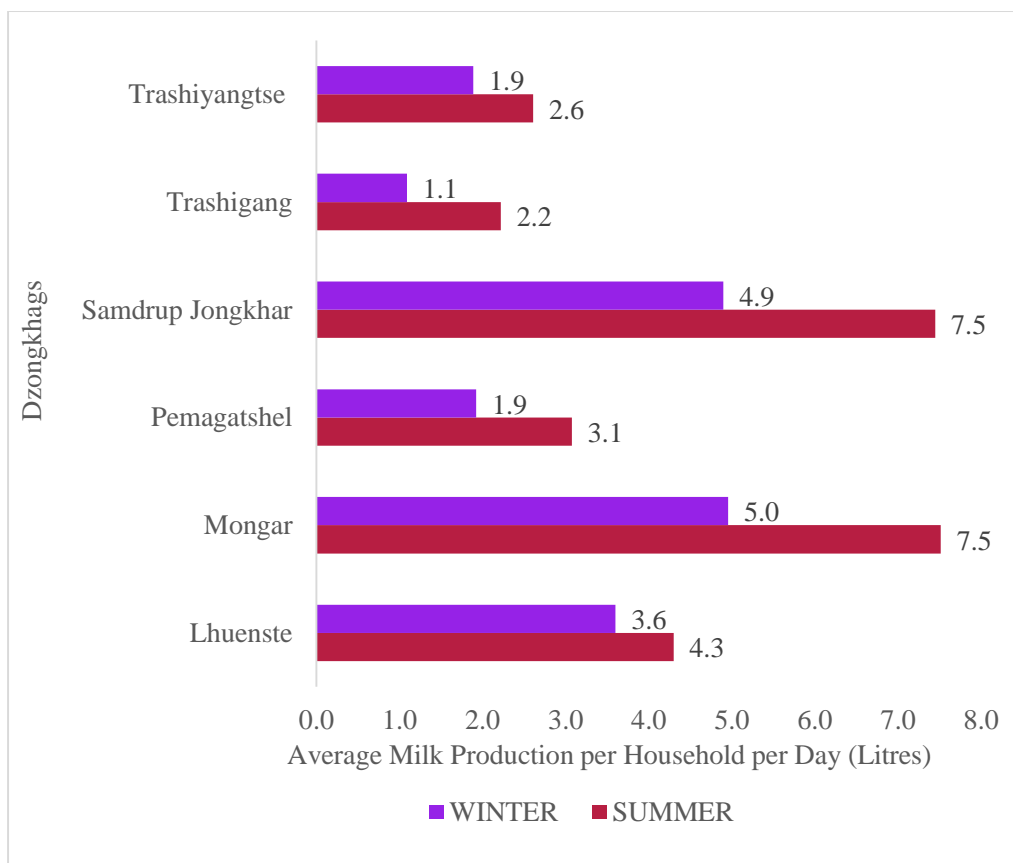


Figure 2: Average milk production per household per day by improved breed of cattle

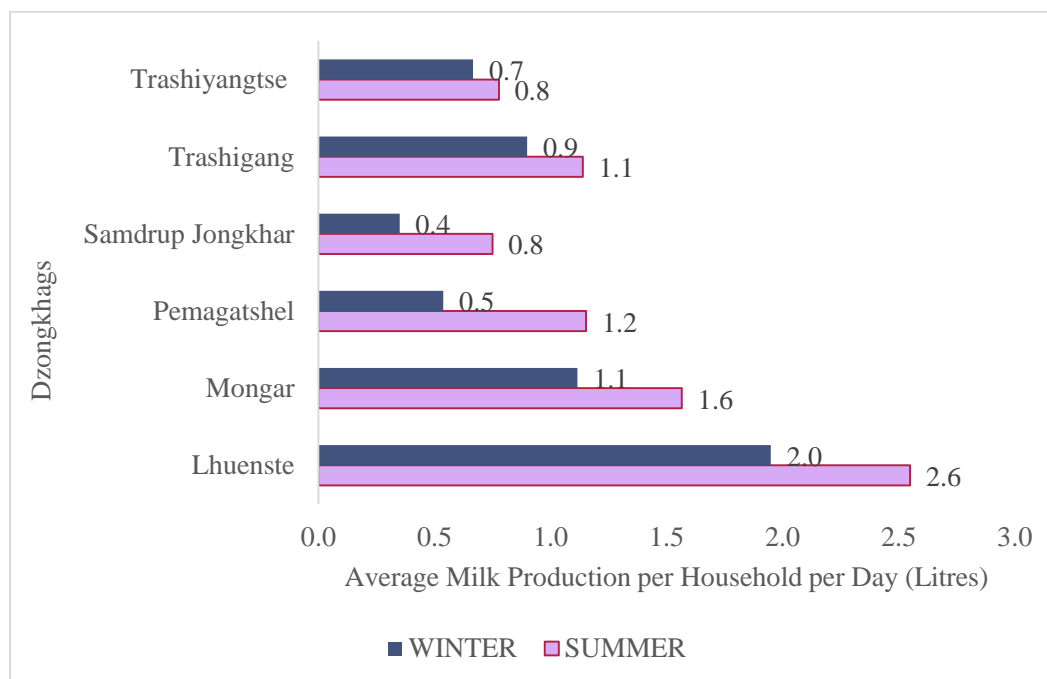


Figure 3: Average milk production per household per day by local breed of cattle

3.8 Adoption of Crops and Livestock Production Technologies

Table below shows the number and percentage of households that have adopted each technology. Sprinkle Irrigation is the most widely adopted technology, with 21.9% of households utilizing this method. Greenhouse and Poly-tunnels rank second in adoption, with 19.6% of households adopting this technology. New Vegetable Production Techniques are adopted by 16.6% of households, making it the third most common technology. Technologies like Post-harvest Technologies and Solar Dryers are the least adopted, with only 2.0% and 0.6% of households using them, respectively. This data indicates a diverse range of crop production technologies being adopted, with a notable preference for irrigation techniques and protected cultivation methods. **Figure 4** shows that 62% of the households have adopted more than one type of agriculture production technology support while 2% of the households reported zero adoption in 2023.

Table 16: Agriculture Production Technologies Adopted by the HHs

	Types of crop production technology adopted	No. of HHs responding	Adoption rate in Percent (%)
1	New Vegetable Production techniques	57	16.6
2	Post-harvest Technologies	7	2
3	Plant Protection	27	7.9
4	Farm mechanization and Land Development	23	6.7
5	Soil and Water Management	23	6.7
6	Greenhouse and Poly-tunnels	67	19.6
7	Drip Irrigation	23	6.7
8	Sprinkle Irrigation	75	21.9
9	Composting (Heap compost or vermicomposting)	22	6.4
10	Solar Dryer	2	0.6
11	Others	16	4.7
	Total	342	100

***Note: Others include agriculture production technologies like Syntax, seeds and seedlings, mushroom shed, kiwi trellising, fodder plantation, installation of solar fencing, etc.*

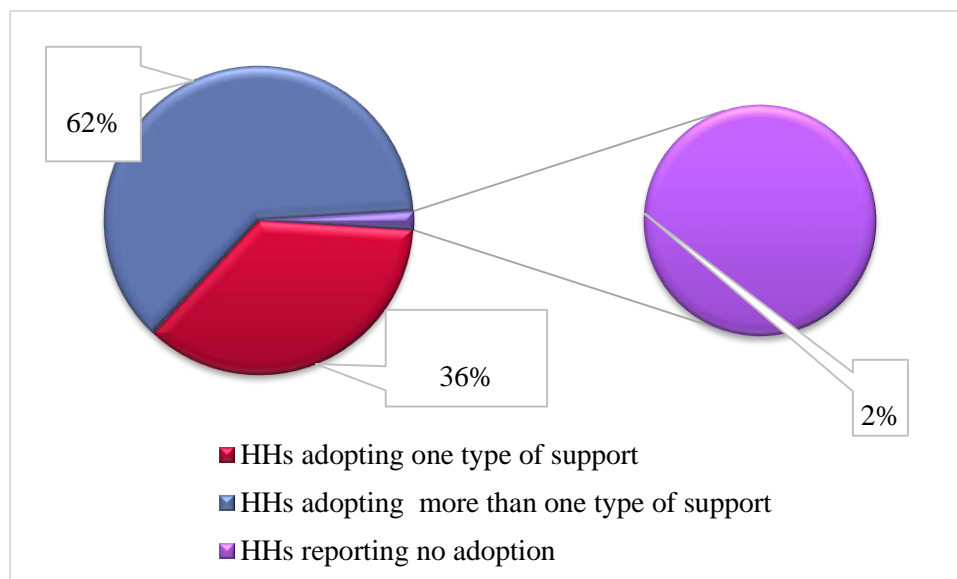


Figure 4: Number of new agriculture production technology supports adopted by the HHs

The following **Table 17** provides a detailed analysis of the adoption rates of various livestock production technologies among households (HHs). The data includes the number and percentage of households that have adopted each technology. Improved Fodder Grass Plantation has the highest adoption rate at 22.6%, indicating a strong interest in enhancing fodder quality and availability. Winter Fodder Cultivation is also widely adopted, with a 19.4% adoption rate, reflecting the importance of seasonal fodder management. Overall, the adoption patterns reflect a focus on improving livestock productivity and sustainability through better fodder management, housing, and milk production practices. The **Figure 5** represents 37% of the HHs adopted more than one livestock production technology and 28% reported no adoption.

Table 17: Types of Livestock Production Technology Adopted by the HHs

	Types of Livestock production technology adopted	No. of HHs responding	Adoption rate in Percent (%)
1	Milk Processing and Packaging	16	5.7
2	Fodder conservation technology	39	13.8
3	Clean Milk production	53	18.7

4	Bio-gas	20	7.1
5	Improved fodder grass plantation	64	22.6
6	Winter Fodder cultivation	55	19.4
7	Improved Cattle shed	31	10.9
8	Total Mixed Ration	1	0.4
9	Others	4	1.4
Total		283	100

***Note: Others include livestock production technologies like chaff cutters, Fodder namely Napier etc.*

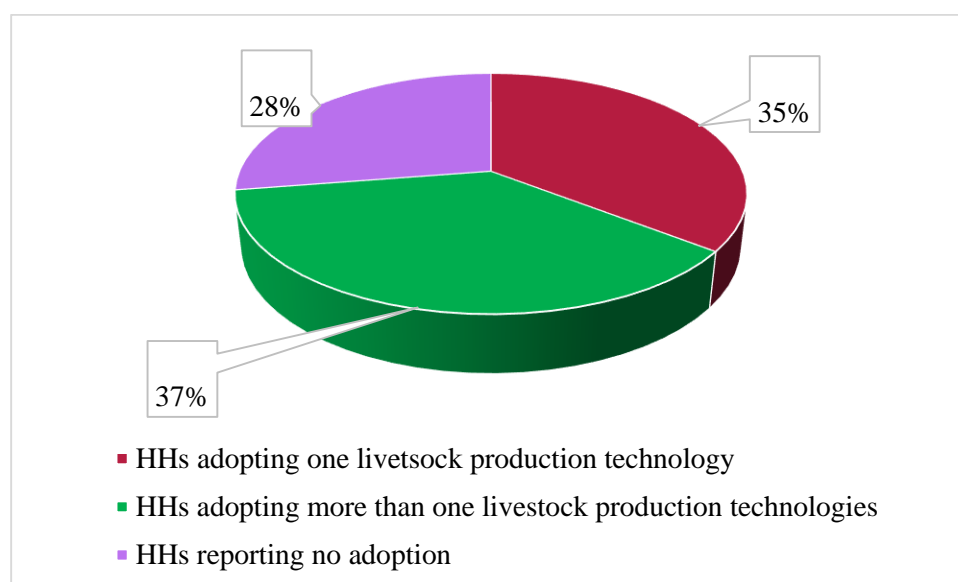


Figure 5: Number of livestock production technology adopted by the HHs

3.9 Production of Improved Fodder

Table 18 displays the fodder cultivation across sample gewogs within the programme dzongkhags reveals that Samdrup Jongkhar leads in improved fodder cultivation with 18.9 acres. In contrast, Mongar has the largest area dedicated to winter fodder cultivation, totaling 11.8 acres. The combined data from six dzongkhags indicate 39.52 acres under improved fodder cultivation and 17.89 acres under winter fodder cultivation. However, Lhuentse and Pemagatshel are notably lacking in fodder conservation techniques. The surveyed gewogs report a total silage production of 32,130.3 kilograms, conserved for lean season use. On average, the area under improved fodder grass

cultivation per household is 0.19 acres, while winter fodder cultivation averages 0.08 acres per household. The areas under improved fodder cultivation and winter fodder cultivation is displayed in the pie charts in **Figure 6** and **7** respectively.

Table 18: Areas under Improved Fodder and Winter Fodder Cultivation

Dzongkhags	Area under improved fodder (acres)	Area under Winter fodder (acres)	Fodder conserved/ Silage prepared (Kg)	Quantity of commercial feed purchased (Kg)
Lhuentse	0	2.33	0	750
Mongar	6.15	11.8	26,480	33,446
Pemagatshel	2.1	0.7	0	96,600
Samdrup Jongkhar	18.9	1	200	5,650
Trashigang	1.32	1.05	4350	4,455
Trashiyangtse	11.05	1.01	1,100.30	3,500
Total	39.52	17.89	32,130.30	144,401
Average	0.19	0.08	160.65	722.01

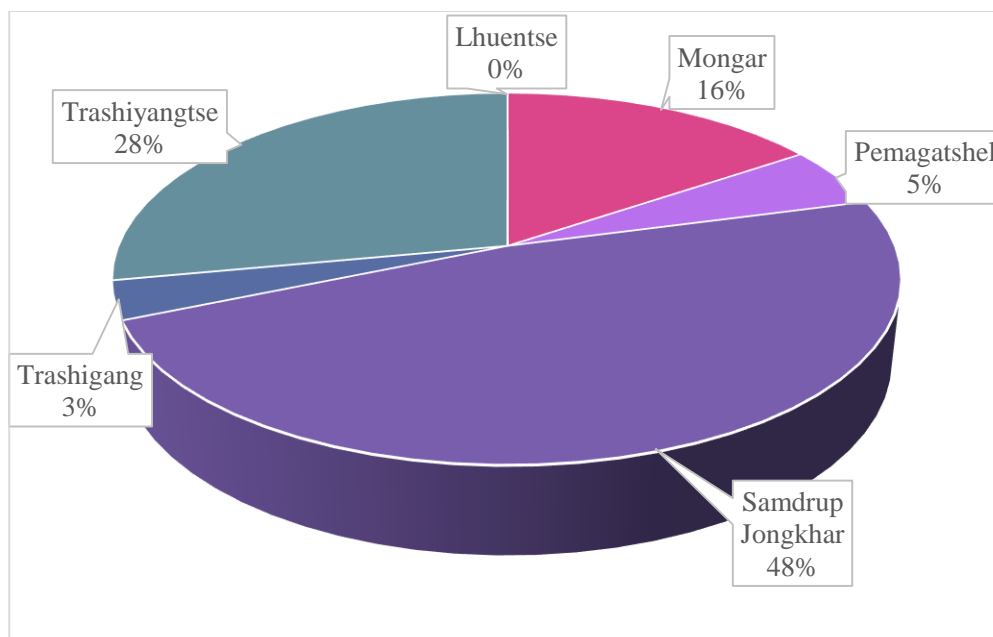


Figure 6: *Percentage of areas under improved fodder cultivation in sample population*

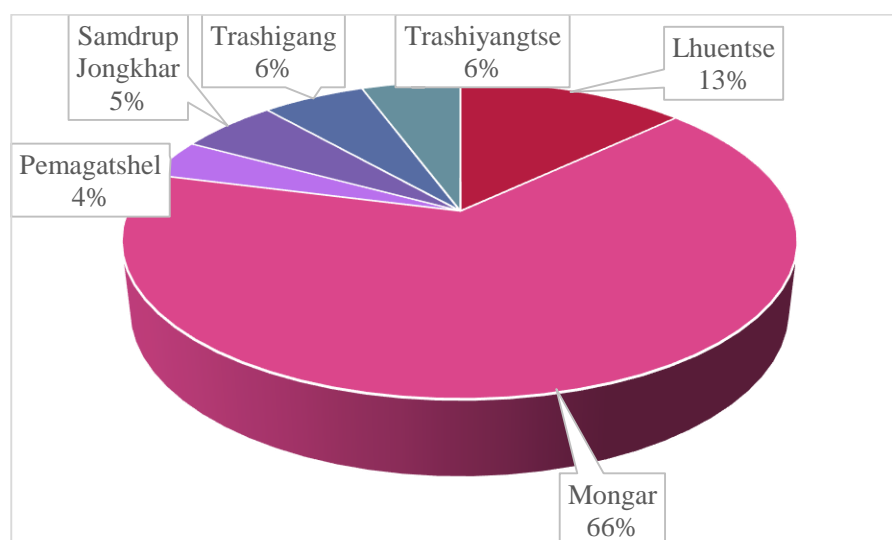


Figure 7: *Percentage of areas under winter fodder cultivation in sample population*

3.10 Cattle Shed in Programme Areas

The table below details the promotion of improved cattle sheds in the sample gewogs, facilitated by Project assistance. 181 households reported livestock rearing activities of which 34.80% have cattle sheds equipped with concrete floors, CGI roofing, mangers, and troughs. Conversely, 18.23% of households reported lacking proper cow sheds. Overall, 81.75% of the surveyed households have access to improved cattle sheds.

Table 19: HHs owning Different Types of Cattle Shed

	Types of cattle shed	HHs Responding	(%)
1	Concrete floor and CGI roofing with manger and trough	63	34.8
2	Concrete floor and CGI roofing without manger and trough	38	20.99
3	Single Roofing without concrete floor	47	25.96
4	No proper cow shed	33	18.23
	Total	181	100

3.11 Marketing of Agriculture and Livestock Produce

3.11.1 Marketing and Markets of Vegetables

A total of 129 households from 200 sample households reported to be engaged in selling vegetables which is approximately 64.5%. Out of 129 households engaged in vegetable sales, 23 households (17.82%) market their produce in groups, while 106 households (82.17%) sell their vegetables individually. This indicates a predominant preference for individual marketing among the surveyed households.

Table 20: Marketing of Vegetable

Marketing Strategy of Vegetables	No. of HHs responding	(%)
Marketed in groups	23	17.82
Marketed individually	106	82.17
HHs involved in vegetable selling	129	100

Local markets within the vicinity were identified as the primary marketplace for vegetable sales. According to the Annual Outcome Survey (AOS) of 2018, 33% of households ranked local markets as their top marketing avenue for vegetable produce. This preference slightly increased in 2023, with 34.8% of households ranking local markets as their number one marketing location.

Table 21: Top Three Markets for Marketing Vegetables

Top three market places ranked by the HHs			
	Ranked 1	Ranked 2	Ranked 3
Sample group	Local market within vicinity	Thromde Market	Schools and institutions

3.11.2 Marketing and Markets of Dairy Product

The marketing strategies employed by households (HHs) that sell dairy products, distinguishing between those who market vegetables in groups and those who do so individually are displayed in **Table 22**. Out of the total 122 households involved in dairy product marketing, 40.98% (n=50) market their dairy products in groups, whereas 59.01% (n=72) market individually. The data highlights a preference for individual marketing among these households.

Table 22: Marketing Strategy in Marketing Dairy Products

Marketing Strategy of Dairy product	No. of HHs responding	(%)
Marketed in groups	50	40.98
Marketed individually	72	59.01
Total HHs selling Dairy products	122	100

Table 23, presents the top three market places for dairy products as ranked by households (HHs). The local market within the vicinity is the most preferred, ranked first by the majority of households. Thromde Market and Chenari Dairy Plant follow, ranked second and third, respectively. This ranking highlights the prominence of local and regional markets in the dairy marketing strategies of these households.

Table 23: Top Three Markets for Dairy Produce Marketing

Top three market places ranked by the HHs			
	Ranked 1	Ranked 2	Ranked 3
Sample group	Local market within vicinity	Thromde Market	Chenari Dairy Plant

Table below (**Table 24**), summarizes the responses of households (HHs) regarding the impact of bulk buying by traders or persons on market accessibility. Among the 200 households surveyed, 28 (14%) reported the prevalence traders or persons buying in bulk. Of these, a majority (27 HHs, 96.4%) reported that this marketing arrangement improved their accessibility to markets, while only 1 household (3.6%) did not observe an improvement. This indicates a positive correlation between bulk buying practices and enhanced market accessibility for the participating households.

Table 24: Marketing Agents and its Impact on Market Accessibility

Sample Group	Traders or Person buying in bulk			Has this Marketing Arrangements improved accessibility to markets		
	HHs responding "Yes"	HHs responding "No"	Total No. of HHs	HHs responding "Yes"	HHs responding "No"	Total
	28	172	200	27	1	28

3.12 Biogas Promotion

Table 25, presents data on the ownership and daily usage of biogas among households across different Dzongkhags. Overall, a total of 51 households are reported to use biogas. Mongar has the highest number of households (n=28) using biogas followed by Lhuentse with 11 households using biogas.

Table 25: Biogas Ownership and Average Daily Usage by the Dzongkhags

	Dzongkhags	No. of HHs owning Biogas
1	Lhuenste	11
2	Mongar	28
3	Pemagatshel	4
4	Samdrup Jongkhar	5
5	Trashigang	3
6	Trashiyangtse	0
	Total	51

As shown in figure below (**Fig 8**), The highest percentage of households (49.0%) use biogas for 30 minutes to 1 hour, while the lowest percentage (13.7%) use it for 1-2 hours. A notable proportion of households (15.7%) reported of the malfunctions in the biogas systems.

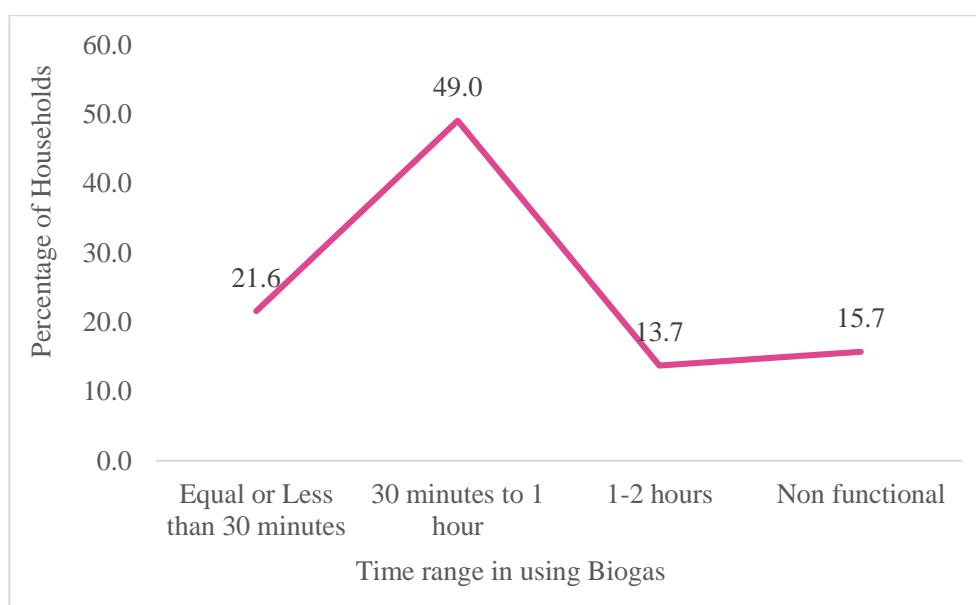


Figure 8: *Percentage of HHs using biogas for varying time ranges*

3.12.1 Trends in Use of Other Energy Sources After the Biogas Installation

Figure 7, shows the trends in biogas usage as reported by 51 households. The majority of households (66.7%, n=34) reported a decrease in use of other energy sources. A small proportion

(3.9%, n=2) indicated an increase, while 29.4% (n=15) reported that the use of other energy sources remained the same. This data illustrates a significant trend towards decreased usage of other energy sources among the surveyed households.

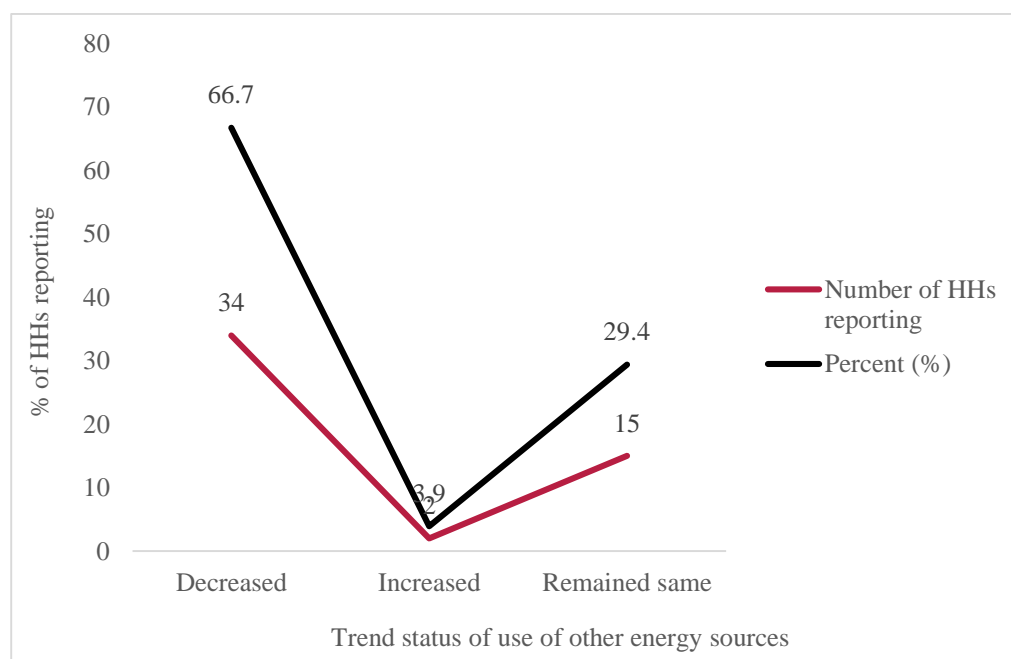


Figure 9: Trends in use of other energy sources after biogas installation

3.12.2 Energy Sources for Cooking before Biogas Installation

Table 26, provides an overview of the energy sources for cooking used by households before the installation of biogas. Among the households now using biogas, 37 previously used firewood, 29 used LPGs, and 47 relied on electricity. None of the households reported using a kerosene stove for cooking before switching to biogas. This data reflects the diversity of previous energy sources and highlights the transition to biogas as an alternative cooking energy source.

Table 26: Energy Sources for Cooking Before Biogas Installation

Energy sources for cooking before biogas				
	Firewood	LPGs	Electricity	Kerosene stove
No. of HHs using biogas responding	37	29	47	0

****Note:** Each household has the choice for more than one answer in choosing the energy source for cooking before the biogas installation.

3.12.3 Technical Problems on Use of Biogas

Table 27, presents the responses of 51 households when asked whether there are technical issues and problems associated with the use of biogas. Majority of households (52.94%, n=27) using biogas reported that no technical issues were prevalent while 47.06% (n=24) reported the prevalence of technical issues in biogas. This distribution indicates a slight majority of negative responses among the surveyed households.

Table 27: Household Responses on Issues Related to Biogas

Responses of the HHs	Number of HHs reporting	(%)
No	27	52.94
Yes	24	47.06
Total	51	100

Table below outlines the technical problems encountered by households (HHs) using biogas. The most frequently reported issue is the lack of a skilled operator, affecting 15 households. Other significant issues include the labor-intensive nature of biogas systems (reported by 10 HHs), minimal gas production due to cold temperatures (9 HHs), and insufficient dung input and gas leakage, each reported by 7 households. A smaller number of households reported problems related to the distance of the biogas system from the kitchen (5 HHs) and poor equipment design (1 HH). No households reported stove-related problems. This data highlights the range of technical challenges faced by biogas users.

Table 28: Technical Problems Reported by Households (HHs) Using Biogas

	Technical problems	No. of HHs reporting
1	Lack of skilled operator	15
2	Poor equipment design	1
3	Insufficient dung input	7
4	Labor intensive	10
5	Gas Leakage	7

6	Stove Problem	0
7	Minimal gas production due to cold	9
8	Far away from kitchen	5
Total		54

***Note: Number of households reporting is more than the actual number of households using biogas. This is when accounting to multiple technical problems faced by one household.*

3.13 Irrigation Infrastructure

Table 29, presents the survey results on irrigation infrastructure. As shown in Table 4, out of 200 households, 59 received support while 141 did not. Furthermore, a doughnut model has been displayed in **Figure 10** showing the percentage of households impacted by the irrigation infrastructure. Out of a total of 59 households receiving irrigation support from the sample plots, 56% of the households reported significant reduction in the farm water shortage while 44% reported no improvements in the farm water shortage.

Table 29: Irrigation Facility Availed by HHs

	Household responses on Irrigation Support		
	Yes	No	Total
No. of HHs responding	59	141	200

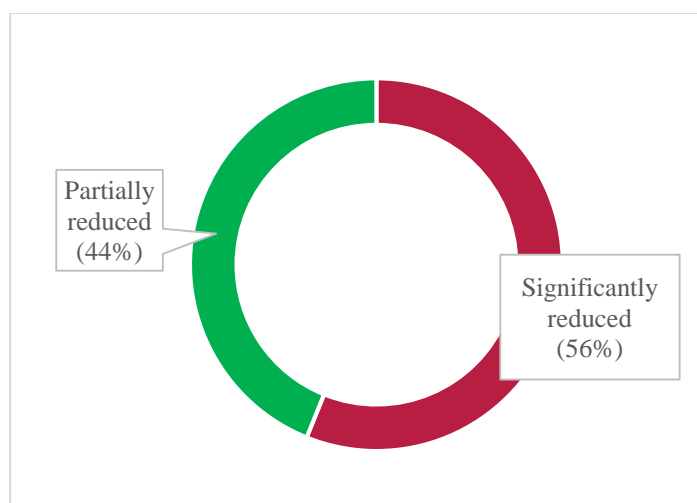


Figure 10: Percentage of HHs impacted by Irrigation Infrastructure in curbing the farm water shortage.

3.13.1 Irrigation Infrastructure

The analysis in **Table 30**, highlights the number of households receiving irrigation support for wetland agriculture. 69 households (34.5%) reported using irrigation systems for wetland agriculture, while 123 households (61.5%) did not use irrigation systems.

Table 30: Households Reporting Irrigation Support from CARLEP for Wetland Agriculture

Dzongkhag	HHs reporting Irrigation Support from CARLEP			Do HHs use irrigation for Wetland Agriculture		
	Yes	No	NA	Yes	No	NA
Lhuentse	3	17	0	20	0	0
Mongar	24	37	0	21	39	0
Pemagatshel	10	8	0	0	11	7
Samdrup						
Jongkhar	12	8	0	3	17	0
Trashigang	5	55	1	13	47	1
Trashiyangtse	5	15	0	12	9	0
Total	59	140	1	69	123	8

The following table delineates the trends in paddy cultivation areas and post-harvest cultivation across six Dzongkhags. 20 households reported increase in cultivation area under cultivation with mean of 0.85 acres per household while 4 households reported decreased trend. Post-harvest cultivation practices in paddy fields are carried out by 4 households, with the highest frequency observed in Trashiyangtse (n=2). A majority of the paddy fields (n=185) do not undergo post-harvest cultivation, indicating a prevalent trend of non-utilization post-harvest.

Table 31: Trends in Cultivation Area and HHs Involved in Post-Harvest Paddy Cultivation

Dzongkhag	Trends in Paddy Cultivation area				Post-harvest Cultivation in Paddy fields			
	Increased	Decreased	Remained same	NA	Yes	No	NA	
Lhuentse	1	1	18	0	0	20	0	
Mongar	6	3	12	40	1	59	0	
Pemagatshel	0	0	0	18	0	9	10	
Samdrup								
Jongkhar	3	0	0	17	0	20	0	
Trashigang	2	0	11	48	1	59	1	
Trashiyangtse	8	0	4	8	2	18	0	
Total	20	4	45	131	4	185	11	
Total increase in cultivation area under irrigation								
(Acres)				17.02				

The Figure (**Figure 11**) below shows the productivity over the last three years across the six dzongkhags. Lhuentse (n=8) and Mongar dzongkhags (n=4) reported some households reporting decrease in the productivity over the past three years which is not the case in any households of Pemagatshel, Samdrup Jongkhar, Trashigang and Trashiyangtse.

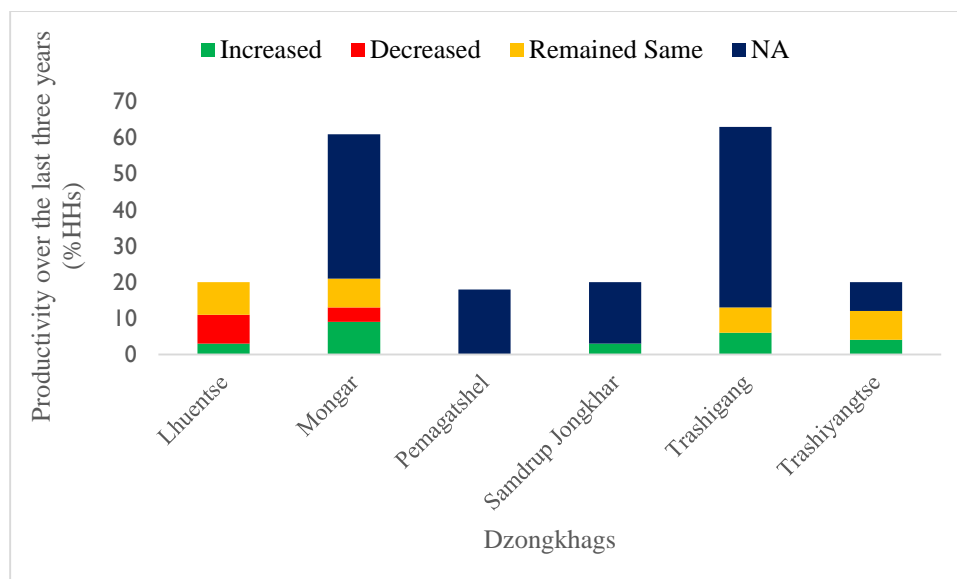


Figure 11: Status of productivity over the last three years after intervention in irrigation infrastructure

3.13.2 Type of Irrigation System used for Vegetable Production

The figure below illustrates the various irrigation methods employed by households for vegetable production. Among these methods, hand watering is the most prevalent, with 106 households utilizing this technique. In contrast, rainwater harvesting is the least favored, with only 6 out of the 200 surveyed households adopting it. This highlights a significant preference for more traditional irrigation methods over rainwater harvesting among the sample population.

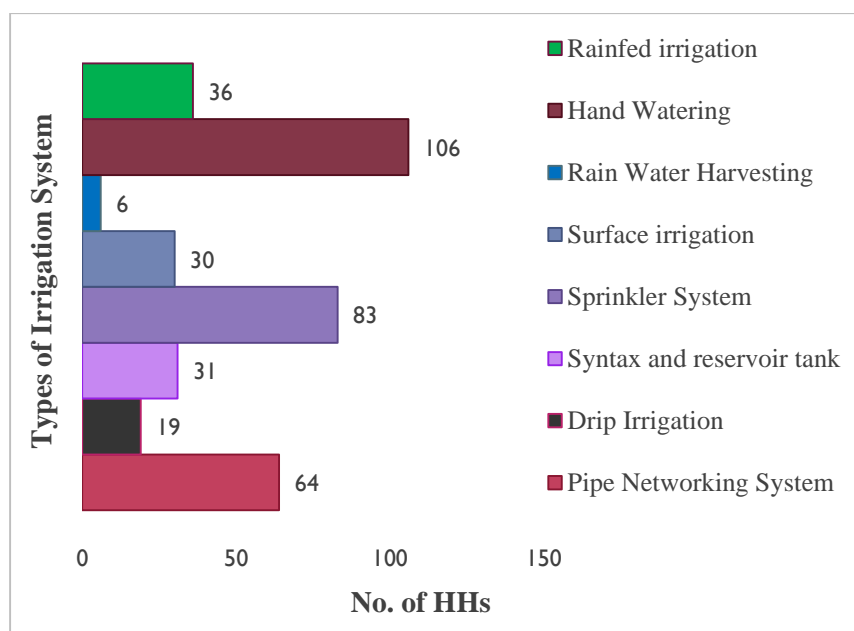


Figure 12: Number of HHs using different irrigation system

3.14 Operation of Farm Machinery

The **Table 32**, presents the gender involvement in operating different types of agricultural machinery, dairy equipment and post-harvest equipment, based on a survey of 200 households. The operators are categorized by gender: man, woman and both. The highest prevalence of joint operation by both male and female members is observed in the use of chaff cutters (63.8%) and dairy equipment (56.7%). Men predominantly operate agricultural machinery (33.3%) and post-harvest machines (34.3%). There is significant female participation in operating dairy equipment (20.5%). A notable proportion of households reported no usage of specific equipment types, particularly post-harvest machines (31.5%) and dairy equipment (29.5%).

Table 32: Gender Involvement in Operating Farm Machineries and Equipment

Type of Machines/ Equipment	Man	%	Woman	%	Both	%	Total
Agricultural machinery (mills)	53	33.3	26	16.3	80	50.3	200
Post-harvest machines (Sheller, hullers, oil expeller)	47	34.3	13	9.4	77	56.2	200
Dairy Equipment (milk churners, cream separator)	32	22.6	29	20.5	80	56.7	200
Chaff cutter	36	25	16	11.1	92	63.8	200

3.15 Household Involvement in Project Activities

Table below (**Table 33**), presents the involvement of households from different Dzongkhags in project activities, highlighting significant regional variations in the data. The table reveals that four Dzongkhags namely Lhuentse, Pemagatshel, Samdrup Jongkhar, and Trashiyangtse reported 100% participation from sample households in 2023. This uniformity suggests a strong consensus or commonality in experiences or perceptions within these regions. In contrast, Mongar and Trashigang displayed a more varied response pattern, with 95.1% and 81.9% participation respectively. Notably, Trashigang had the highest number of households reporting noninvolvement in project activities (11 out of 61). These variations might reflect underlying socio-economic, cultural, or logistical factors influencing the respondents' perspectives in these regions. Further qualitative analysis could provide

deeper insights into the reasons behind these differences, enhancing our understanding of regional disparities.

Table 33: Dzongkhag-Wise Display of HHs Involved in Different Project Activities in 2023

Dzongkhags	"No"	"Yes"	Total	(%)
Lhuentse	0	20	20	100
Mongar	3	58	61	95.1
Pemagatshel	0	18	18	100
Samdrup Jongkhar	0	20	20	100
Trashigang	11	50	61	81.9
Trashiyangtse	0	20	20	100
Total	14	186	200	
%	7	93		

Table 34, presents the household involvement across various project activities. A total of 186 households participated in at least one project activity. The highest involvement was observed in vegetable production activities, with 114 households (57%) receiving inputs and equipment followed by dairy development projects involving 80 households (40%). No households were reported participating in multi-use water schemes, suggesting either a lack of implementation or interest in this particular activity. Additionally, 30 households (9.9%) were involved in various other unspecified activities. It is noteworthy that out of 186 households from the sample receiving support, 52% were reported to be involved in only one project activity, indicating a substantial portion of households focusing their efforts on a single type of project. Additionally, 48% of the households reported to have received support in more than one project interventions (**as shown in Figure 13**).

Table 34: Involvement of Households in Project Activities

Types of project activities		No. of HHs involved
1	Farmers Training	25
2	Vegetable Production (inputs and equipment)	114

3	Dairy Development (inputs and equipment)	80
4	Marketing and Agri-business (record and book keeping etc.)	4
5	Irrigation Canal Renovation	8
6	Multi-use Water Scheme	0
7	Efficient irrigation system- Drips System	10
8	Lead Farmer or Farmer-to-farmer training	11
9	SLM and Land Development	21
10	Others	30
Total		303
No. of HHs involved in only one project activity		96

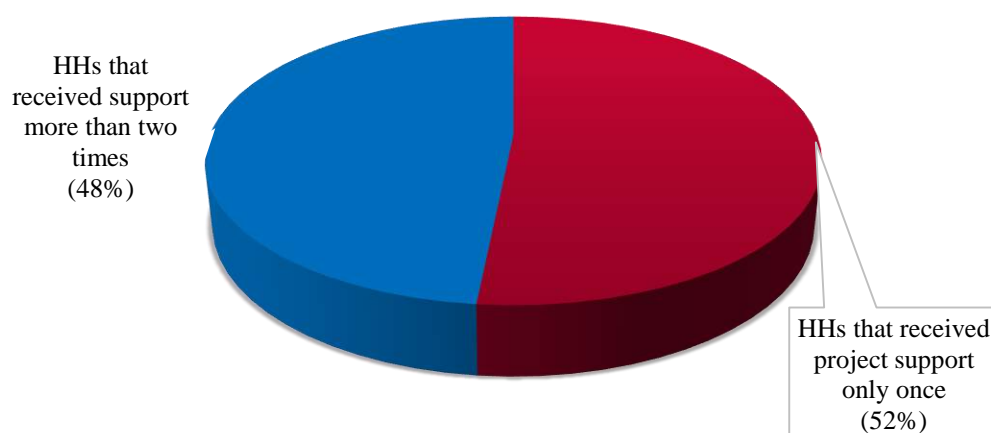


Figure 13: *Percentage of frequency of support received by beneficiary HHs*

3.15.1 Involvement of Households in Other Project Activities

Table below presents the details of households involved in other project activities other than CARLEP. 155 households (77.5%) were found not involved in the any other project activities with 45 number of households reported involved in other project activities

Table 35: Household Involvement in Other Project Activities (Other than CARLEP)

Dzongkhags	"No"	"Yes"	Total
Lhuentse	20	0	20
Mongar	45	16	61
Pemagatshel	15	3	18
Samdrup Jongkhar	13	7	20
Trashigang	53	8	61
Trashiyangtse	9	11	20
Total	155	45	200

Table 36, presents the various types of support rendered to households and the number of households that responded to each support type. The most frequently reported types of support were fodder slips and efficient irrigation, each received by 34 households. Land management was another significant type of support, received by 22 households. Less common types of support included mushroom cultivation, upland paddy, improved pasture seeds, native poultry, stress-tolerant vegetable seeds, and rainwater harvesting.

Table 36: Various Type of Support Received by the HHs

	Type of support rendered	No. of HHs responding
1	Land management	22
2	Fodder slips	41
3	Mushroom	4

4	Upland paddy	3
5	Improved pasture seeds	4
6	Native poultry	3
7	Stress tolerant vegetable seeds	34
8	Rain water harvesting	3
9	Efficient irrigation	34

Figure 14 illustrates the status of vegetable cultivation practices in paddy fields following the harvest. A mere 2% of households reported engaging in vegetable cultivation in the paddy fields post-harvest, while the majority of households indicated the absence of such practices.

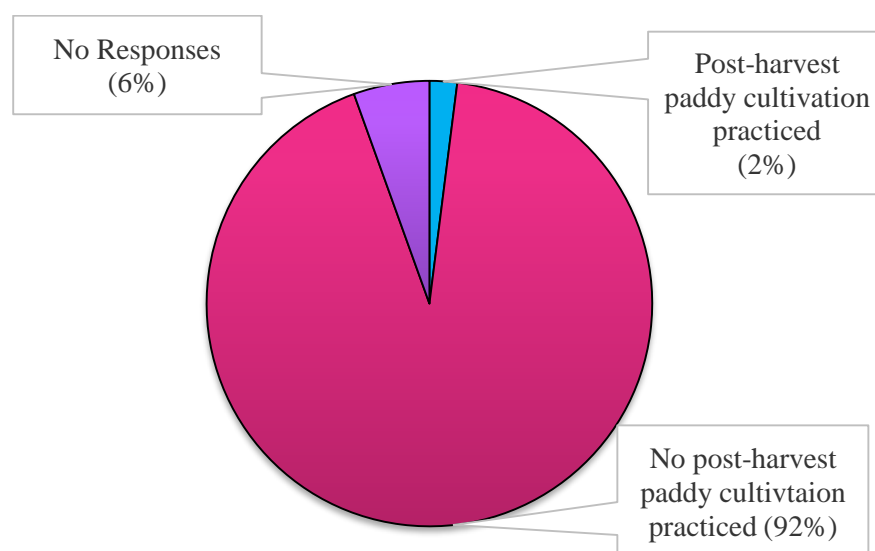


Figure 14: *Number of HHs cultivating vegetables in paddy after harvest*

3.16 Satisfaction Ratings by Households on Project Implemented Activities

Out of the 200 households surveyed, a majority (56.6%) reported being highly satisfied with the implemented project activities. A significant portion (34.5%) indicated moderate satisfaction, while a minimal number (0.5%) expressed dissatisfaction. Additionally, 8.5% of households did not provide a response. This distribution underscores a predominantly positive reception towards implemented project activities among the surveyed households.

Table 37: Satisfaction Ratings by Households on Project Implemented Activities

	Type of Satisfaction ratings by HHs	No. of HHs reporting	%
1	Highly satisfied	113	56.6
2	Moderately satisfied	69	34.5
3	Not satisfied	1	0.5
4	No response	17	8.5
	Total	200	100

3.17 Major Problems Faced by Households

As a final question of the household interview, the respondents were asked to list three major problems faced by the households in crop and livestock production in the year 2023. The responses have been summarized in Table. The number one problem faced is the human wildlife conflict with wild animal encroachment becoming prominent. Interestingly, human wild life conflict was reported as the second major problem faced by the households.

The project has intervened to mitigate conflicts between humans and wildlife by providing solar and electric fencing to households that are vulnerable to wildlife encroachment. However, these measures have proven to be inadequate in effectively addressing human-wildlife conflicts. According to Threlphoog Tshogpa, Chimi Rinzin, despite achieving 90% coverage with solar fencing in their gewog, significant challenges persist. Farmers report difficulties in maintaining the solar fences, which often become non-functional after a few years. This degradation leads to wild animals entering crop fields, causing significant damage. Additionally, solar fences are ineffective against certain predators, such as monkeys, which are major threats to crops. As a result, many farmers are now reluctant to cultivate their land.

Similarly, while electric fencing has provided short-term control, it has become less effective over time. Wild animals, including deer, monkeys, and wild boar, have adapted and can now breach these barriers, continuing to damage crops, as reported by the Mongar Gewog Administrative Officer. In contrast, in 2020, the Nashoen Sanam Detshen at Phanglem Zor, under Radhi Gewog Trashigang, installed 0.66 kilometers of chain link fencing with financial support from the project. According to Extension Officer Narayan Subba, this type of fencing has proven to be a more effective solution for protecting crops from wildlife. It has successfully revived more than 4 acres

of wetland that had remained fallow for over two decades and productivity of the crops has been greatly boosted with minimal wildlife encroachment and damages.

Table 38: Number One Major Problem Faced by HHs.

	Types of major problems faced by HHs	No. of HHs responding	%
1	Climate change impacts	3	1.5
2	Delayed payment for products and services	1	0.5
3	Health problems	4	2
4	Financial problems	17	8.5
5	Fodder shortages in winter	2	1
6	Human wildlife conflict	55	27.5
7	Infertile land and less arable land	2	1
8	Irrigation issues	5	2.5
9	Labor shortages	48	24
10	Less milching cows	1	0.5
11	Loan repayment	2	1
12	Marketing issues	11	5.5
13	Limited farm machinery access	1	0.5
14	No problems	27	13.5
15	Pests and diseases	15	7.5
16	Transportation	1	0.5
17	Water shortages	5	2.5
	Total	200	100

Table 39: Second Major Problem Faced by the HHs

	Types of major problems faced by HHs	No. of HHs responding	%
1	Climate change impacts	5	2.5
2	Delayed payment for products and services	2	1
3	Health problems	2	1
4	Financial problems	4	2
5	Fodder shortages in winter	5	2.5
6	Human wildlife conflict	45	22.5
7	Infertile land and less arable land	1	0.5
8	Irrigation issues	10	5
9	Labor shortages	27	13.5
10	Marketing issues	8	4
11	Pests and diseases	10	5
12	Transportation	3	1.5
13	Defunct electric fencing	1	0.5
14	Water shortages	6	3
	Total	129	100

Table 40: List of Third Major Problems Faced by the HHs.

	Types of major problems faced by HHs	No. of HHs responding	%
1	Climate change impacts	1	1.5
2	Health problems	1	1.5
3	Financial problems	6	9.2

4	Fodder shortages in winter	2	3
5	Human wildlife conflict	7	10
6	Irrigation issues	3	4.6
7	Labor shortages	17	26
8	Rural-Urban migration	0	0
9	Marketing issues	12	18
10	Limited farm machinery access	1	1.53
11	Pests and diseases	12	18
12	Transportation	3	4.6
Total		65	100

3.18 Trend Analysis

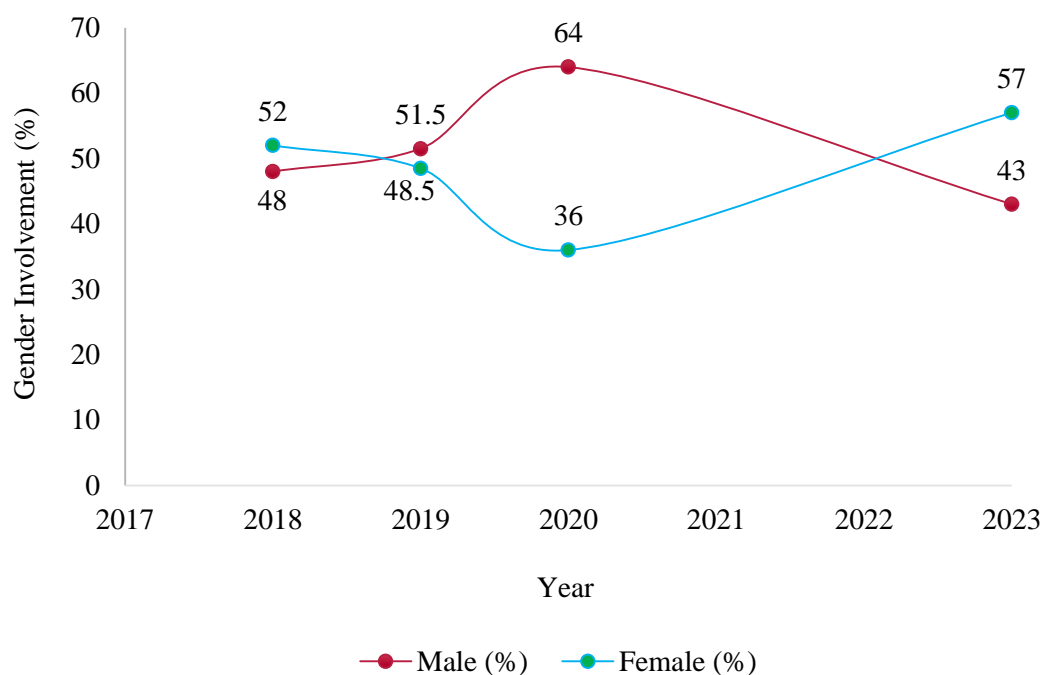


Figure 15: Gender participation in project activities over the years

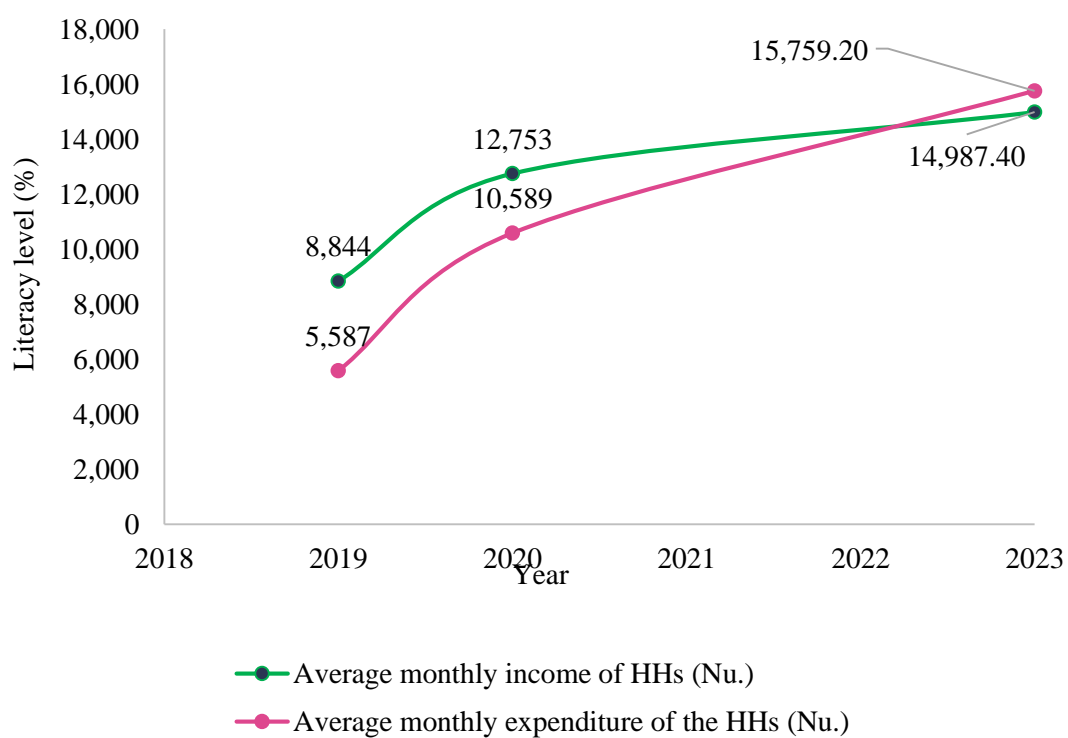


Figure 16: Literacy level of the respondents over the years

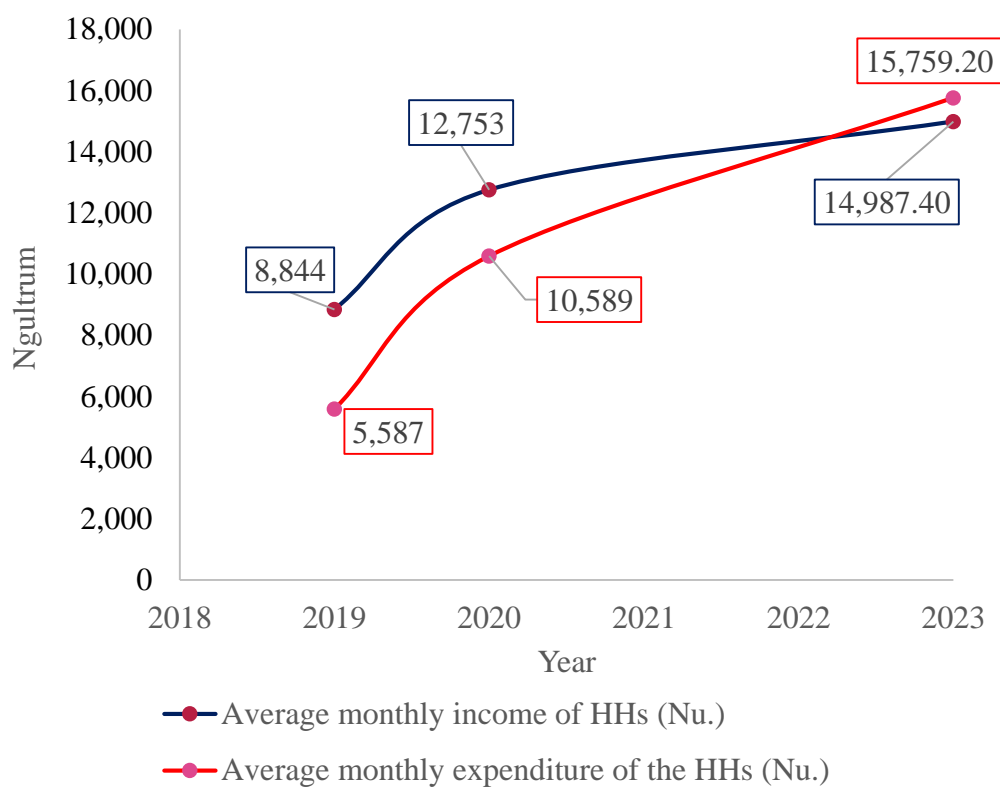


Figure 17: Monthly average income and expenditure of the HHs over the years

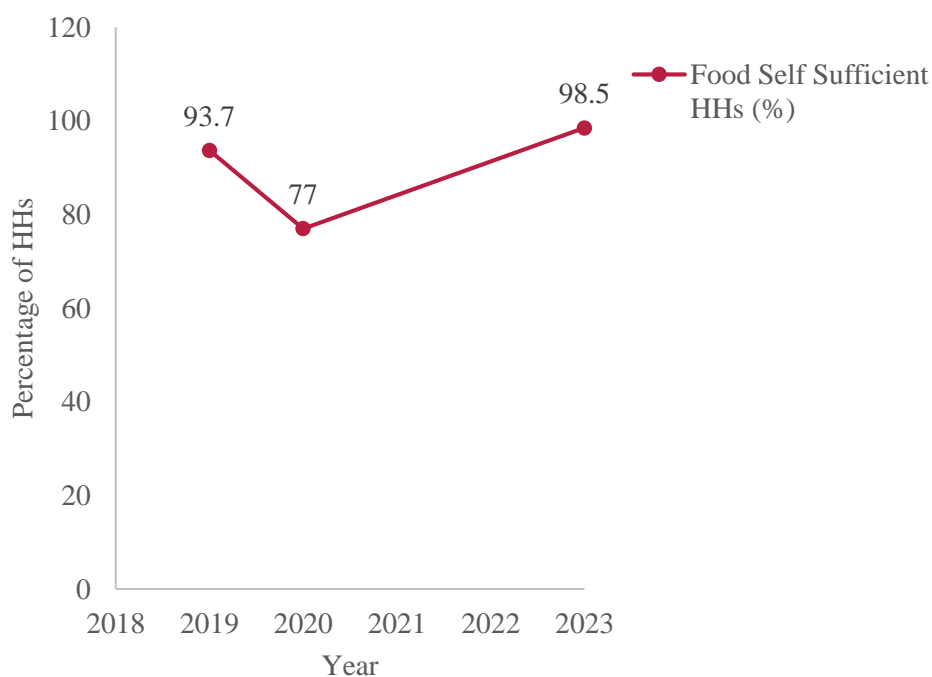


Figure 18: Food self-sufficiency status over the years

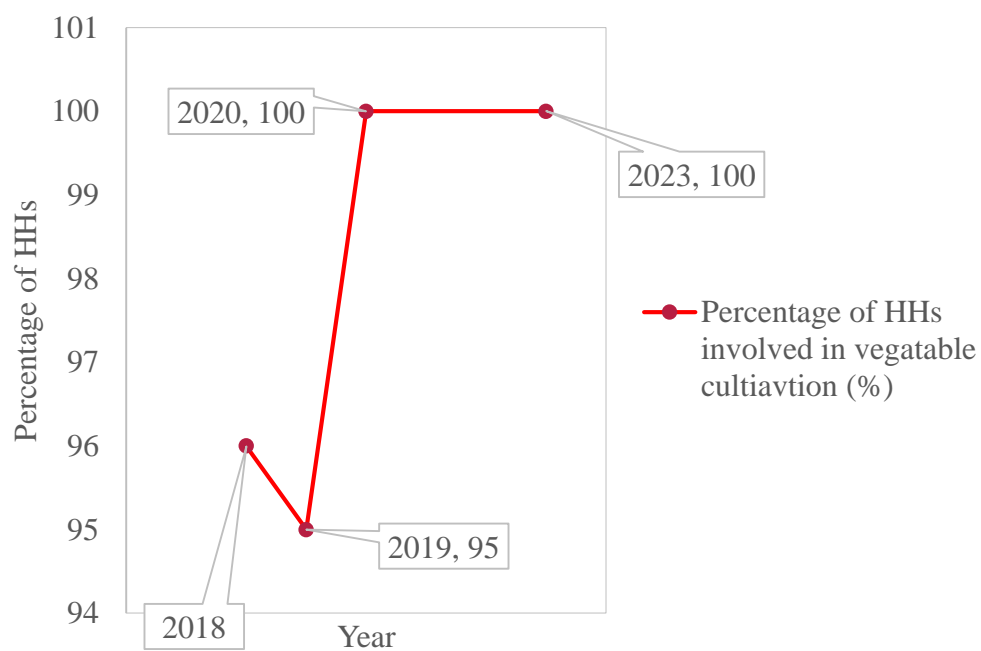


Figure 19: *Percentage of HHs involved vegetable cultivation over the years*

3.19 Key Informant Interviews

Interviews were held with the Local leaders namely Gups, Tshogpas, Mangmis, Gewog Administrators and Traders/ Aggregators. The main discussion point included the changes observed as a result of the interventions from the Project. In addition, the implementation status of the planned activities for 2023 was also discussed and recorded. A summary of the Key Informant Interviews Report is placed below. The detailed report is presented in Annexure 1A.

Quotes from the Key Informants

- *“The farmers' training programs have led to significant advancements. The skills of farmers have been enhanced, offering broader opportunities to integrate with contemporary farming practices and technologies. These training sessions have introduced innovative concepts, improving agricultural and dairy farming techniques. As a result, routine activities have become more efficient”*, reported by Lumang Gewog Administrative Officer.
- *“Integrating the lessons provided by CARLEP can help the poor section of the farmers to get ideas and work towards improving their financial situation while helping the economy of our nation”* reported by Kharphu Tshogpa, Kinzang Choden.
- *“The interventions on market-led production under dairy value chain can be consider as a key success in the project. The individuals and small dairy groups are being expanded; new potential groups formed. Provision of Inputs such as improved breeds and materials for shed construction motivates and encourages the individuals and groups. Further, with the establishment of MCC and MPU in strategic locations made it easier and comfortable. The most driving factor for this success is with the availability of market namely (Kofuku)”* reported by Dzongkhag Agriculture Officer, Trashigang.
- *“The drawing of a legal agreement between the service provider and the incumbent households/individuals on the implementation of bigger activities at the enterprise level is a prerequisite to safeguard the scarce resources and time of both parties”* reported by Naina S Tamang, Chief Dzongkhag Livestock Officer, Trashigang.

3.19.1. Threlphoog Tshogpa, Chimi Rinzin

According to Local Government Leaders, Human Wild-Life Conflict is a major constraint that the farmers of Kangpar Gewog are facing. ‘Despite the 90% coverage of Solar fencing, there is still major Human Wild-Life Conflict our farmer faces’ says Threlphoog Tshogpa, Chimi Rinzin. According to him farmers are challenged technically in taking care of the solar fence which becomes

non-functional after few years. This leads to wild animals entering the crop fields and damaging their farm crops. And solar fence is helpless to defend monkey which is the main predator of crops. Due to such issues now, farmers are reluctant cultivate their land. Annually the area under cultivation is decreasing and rate of rural urban migration (goong-tong) are increasing.

With all the chiwogs connected with Motorable roads, now farmers are focusing on vegetable cultivation in commercial level especially the chilli and potatoes. These two crops are the main source of income for people of Kangpar' said Gup Sangay Tenzin. Like in the past rearing of cattle in herd has drastically declined and farmers are opting for jersey cow but the production is low as per LG officials.

3.19.2. Aggregators or traders or middle men

Mr. Lobzang Dawa from Momla village under Bedengphoog-Merdag chiwog is one of the seasonal aggregators under Kangpar gewog. Likewise, Mr. Yang Dorji from Drowanchema is also an active aggregator and collects vegetables and NWFP from within the Gewog and also from other nearby gewogs Thrimshing and Lumang. It has been more than five years for both of them being aggregators/middle man.

Mostly they collect vegetables like chilli being the main cash crops of Kangpar farmers. Potatoes, Brinjal, beans and other vegetables are also marketed by two of them. Mr. Lobzang Dawa could sell 6250 kilograms of green chillies and 4000 kilograms of potatoes during 2023. He could earn a profit of Nu. 30,000/- only. Mr. Yang Dorji also collected and sold around 10,000 kilograms of chillies and Potatoes along with NWFP.

According to aggregators it is not a good profit but are able to sustain and market the RNR produce. They have to travel long distant to sell the produces to places like Samdrup Jongkhar, Pema Gatshel and Zhemgang also. Transportation during summer which is the peak season for vegetable production, road gets blocked and are not able to reach the produce on time leading to losses. Moreover, to export some vegetables to border market area like Garage in India, aggregators have to get approval from concern authorities like Gewog agriculture extension and Bhutan Food and Drug Authority which makes more time consuming. They also face monetary issues as they have to pay farmers in cash in hand. So, providing loans in support of marketing would solve the issues according to Mr. Yang Dorji.

3.19.3. Gewog Administrative Officer

One of the major issues in the community is human-wildlife conflict, which is a significant reason why farmers are leaving their land fallow. Addressing this issue is crucial to encouraging farmers to engage in agricultural activities. One potential solution is the installation of chain link or electric fencing around the fields. In the gewog, vegetables are primarily produced for self-consumption, with only a small portion marketed. Potatoes, cabbage, and cauliflower are among the few vegetables grown for sale. Farmers typically sell their products at the nearby Thromde market in Wamrong, and if production is substantial, they transport their goods to Samdrupjongkhar and supply local schools.

Nearly 90% of the farmers in the gewog own cows, but most of the dairy production is used for self-consumption, with only a small amount sold. Farmers with larger herds supply dairy products to schools. The majority of dairy products are sold within the community, and in cases of large production, they are marketed in the nearby Thromde market in Wamrong. Currently, no major land development practices have taken place in the gewog. The terrain is mostly unsuitable for cultivation due to steep slopes, which also prevent the use of machinery such as power tillers. Land development would significantly benefit the community by enabling the use of agricultural machinery.

Pest problems occasionally occur among farmers, but no major pest infestations have been reported in the gewog. Minor pest issues are managed by the agricultural extension supervisor, who provides pesticides. Disease outbreaks in livestock have occurred, including a nationwide LSD outbreak that affected the gewog. However, timely vaccinations by the livestock supervisor have prevented major outbreaks of diseases like FMD. The gewog also allocates funds for vaccination programs to prevent disease outbreaks. Local governments (LGs) play a crucial role in project planning and implementation. The Gup acts as the chairman, with other LG members serving as participants. Projects are discussed and planned by the LG in collaboration with the concerned agency and focal person. These discussions take place during Gewog Tshogdu meetings, and projects are implemented once approved. During implementation, the focal person leads the projects, with LG members providing support and closely monitoring progress.

Village decision-making is carried out collectively by villagers, guided by Tshogpas, with every household having an equal right to participate. Poorer households are prioritized in developmental activities within the gewog. Although there are some women-headed households, both women and men are equally involved in decision-making. In many gatherings and meetings, women often outnumber men. Climate change has caused numerous unpredictable changes, affecting both

agricultural and livestock activities. Changes in climate have rendered some previously suitable crops unsuitable for cultivation. Additionally, climate change increases the likelihood of new disease outbreaks and pest infestations, as well as unpredictable weather storms.

Extension services are provided to farmers at their doorsteps whenever possible. However, limited manpower in offices poses a challenge, despite the best efforts of the staff. Modern technologies have facilitated the provision of services, but some farmers struggle with these technologies due to illiteracy. The gewog is addressing this issue by providing training and education to farmers on how to use modern technologies.

Farmers' training programs have brought about significant changes, improved farmers' skills and providing opportunities to adapt to modern farming and technologies. These training sessions have introduced new ideas for enhancing farming practices in dairy and agricultural activities, making it easier for farmers to carry out their daily activities. Integrating lessons and successes from the CARLEP project into local government plans has introduced new aspects for project implementation in the gewog. With CARLEP's help, the local government has been able to introduce new technologies and ideas to the community, fostering greater interest in agricultural activities. Additionally, CARLEP has provided opportunities to support poorer households in the gewog and has enabled the local government to plan and execute more activities with their assistance.

3.19.4. Gewog Administration, Mongar Dzongkhag.

Mongar gewog has 6 chiwogs with 775 household depend on Agriculture and Livestock activities. The major support received from CARLEP project are inputs like hybrid seeds for cereal crops, hybrid vegetable seeds, protected agriculture (Green house), drip irrigation sets, land development, dry land irrigation, electric fencing materials, supply of improve breeds on cost sharing 70%-30%, cattle shade materials support like CGI sheet, cements etc.

The immediate impact from the project has improved the living standard and increased income from their dairy products and agriculture produces. In regards to human wild life conflict many farmers have fenced their agriculture land with electric fencing and it has controlled for few years but now wild animals like deer, monkeys and wild boar can easily enter in the field and destroy crops. So, they need support for chain link fencing either on cost sharing basis. The farmers are now cultivating more vegetable with increased areas than before and their production has also increased. So, they have good business opportunity to sell their produces in school (school linking program),

market individually to local vegetable market in Mongar and outside Dzongkhag through local traders.

In connection with project support now many farmers have average 2-5 nos. of improved cattle breeds and enhance dairy product for their own consumption as well as sell their dairy products in the local market and others. Also, from the land development like landscape development, uncultivated land, sloppy and rocky fields now farmers are cultivating more cereal crops, cultivation vegetables and planted fruits trees to increased production and income. Climate has change due to increase in population, more nos. of building construction, drying of water sources and outbreak of forest fire.

They said it don't rain during season and more rainfall when they don't need, even now oranges are growing at higher altitude and some time out break out army worm but get chemicals on time to control. Therefore, farmers should be well aware of plantation, deforestation, usage of chemical fertilizer. Lastly, Project should continue to support with similar activities to both the sector livestock and agriculture to uplift the livelihood and self-sufficiency.

3.19.5. Mangmi (Sonam Lhaden), Tsakaling Gewog

Human wildlife conflict has been and still is the most pressing issue encountered by our farmers in their day-to-day livelihood. This phenomenon is tackled not just in Tsakaling geog but all across the country. Wild animals namely deer, monkeys, wild bores and birds has been the nuisance bothering the farmer's day and night resulting in completely destroying their fruit of their hard work. Meanwhile, pack of wild dogs and coyotes roam the cow herds and villages tormenting, dismembering their cattle and worst slaughtered and eaten in the spot. There were times when the farmers made full utilization of their total land, they owned spanning from far flung farms deep into the forest to areas along Mongar- Lhuntse national highway but now all those lands are left abandoned due to this pressing issue.

With the ever-increasing tax for land, especially with the increased land tax of those lands left unattended, public are frustrated and lost in the dilemma. To counter the pressing issue, farmers have adopted new technology like electric fencing with the supports from RGoB and Projects unluckily monkeys and deer out smarts these measures as well. Farmers here in Tsakaling does subsistence as well large-scale commercial vegetable production depending on their capabilities and the land scape of the farming land they own. The villages of Paytsongbe and Nartse being very suitable for

agriculture machinery due to its gentle and plan land scape, does large scale commercial vegetable production while the other does' medium to small scale vegetable production. There are almost 4-5 registered vegetable production farmers group producing and supplying their produce to the nearby towns and institutions. Majority of the members of the groups are women. Besides that, with loan scheme to purchase agriculture machinery from RENEW and other financial institutions, most of the household own mini to large power tillers and other agriculture machineries to aid in producing vegetables. Farmers here have also adopted green house to produce seedlings and vegetables during harsher cold weather with subsidy supports from RGoB and Projects like CARLEP.

The main vegetables cultivated in Tsakaling geog are chilies, potatoes, cabbages, broccoli, cauliflower, carrots and radishes. Garlic, onions, mustard greens, pumpkins, beans etc. are produced but in smaller scale compared to the main vegetables. The farmers here are also catching up on producing large scale cash crops such as cardamom, azuki beans and oranges. The major market to supply their produce are satellite towns of Gyelpozhing and Lingmethang where they deal directly with the retailers. Potatoes and oranges are sometimes either auctioned to export outside of the country or sold directly to the consumers.

They weekly supply their produce to nearby schools and institutions and signs contracts for school feeding program annually. They do not depend much on middle man to sell their produce. Nonetheless, supplying vegetables to the handful of people residing in those satellite towns become so competitive with suppliers coming from across other geogs to sell the produce as well. In the end their products land up getting rotten and or feed the animal as feed. This issue extremely demotivates the farmers to produce in commercial scale. This year farmers of Nartse village have planted vegetable just for self-consumption. Yet, the farmers are optimistic and hopeful of supplying their produce for the upcoming Gyalsung project.

CARLEP project have supported the farmers in three major parts to boost the dairy industry in Tsakaling geog, those are 1. Feed and fodder 2. Supply of pure jersey bulls to improve the breed of cattle and 3. Feed and fodder machinery like chaff cutter. Presently, each household rear one or two number of jersey cows for their milk as well as for the mature. With the introduction of Artificial Insemination and breeding bulls in the villages, the breeds of cattle and production has been improved tremendously. People have also started planting mass fodder slips in their field which not only use it as feed for their animal but also maintain the stability by making terrace out of fodder slips. The farmers sell their dairy products mainly in Mongar town and satellite towns of Gyelpozhing

and Lingmethang. Last year farmers even made the deal sell their excess milk to KUFUKU milk processing factory in Trashigang but failed to continue due to unreliable milk collecting vehicle.

Land development has made huge positive impact in Tsakaling geog. Since most of the farm land here are inhospitable, stiff slop and rocky soil, it was very difficult for the farmers to work on it. Using power tillers was impossible because of the terrain of the field. On top of that, it is very expensive to hire labor since works had to be done using oxen like olden days. With the support from CARLEP, land development program was held in one chewog. The beneficiaries of this chewog have witness massive improvement in production, working environment, less labor expenditure and time saving. Therefore, farmers expect to continue the land development program in other chewogs as well.

Pest and diseases effecting agriculture industry in Tsakaling was prevalent since back in time but not to this extent which we are witnessing right now. We feel that climate change plays the major role in controlling and multiplying of this pest and diseases.

One of the major pests that has been tormenting the farmers is the Army worm infestation. This worm usually infests on maize and certain vegetables. To mitigate this problem, with close collaboration with gewog administration and agriculture sector we have supplied pesticides and changed the seed of the maize to more resilient variety to combat the pest. This program has greatly improved ever since it was initiated. But the pest is still prevalent in certain areas but not to extent like before. It is the moral responsibility of LG to play this pivotal role in planning and implementing of any sort of project. LG is involved in:

1. Annual budgeting for our agricultural industry of the geog.
2. Spearhead in mitigating agri related issues like pest and diseases, human wildlife conflict
3. Supply of seeds and seedling
4. Timely planning and evaluation to have sustainable project.

Every household is provided with equal opportunities in every aspect of decision making in their locality. Poorer as well matriarchic household has always been the prioritized entity. Provided the same opportunities received by poorer household, getting involved and investing in large commercial agriculture farming projects is challenging because of their sheer size of the land ownership and

financial difficulties. Hence, they are given the opportunities to participate in vegetables production groups as active member and received benefits provided by RGoB and projects.

On the other hand, women headed house participates in decision making just like the patriarchic household does. There is no gender biased. Climate change is a global phenomenon and effects of this phenomenon is being echoed all over our country. Even though we are not climate scientist, we feel that the changing pattern and amount of seasonal rainfall, the orange trees growing in the higher elevation areas of the gewog, increase in temperature like never before can be the aftermath of climate change. There are also instances where we sow the seeds of any particular seasonal crop and the growth is either stunted or the yield is very low or the plant matures and flowers very early.

The service delivered by extension supervisors has been exceptionally well. They are proactive and very professional in their job. They play the vital role in initiating, training and evaluating the farmers for sustainable and successful the project. Trainings in general are very crucial for farmers to upgrade their skills to enhance their productivity be it in agriculture or livestock related industry. Individual household and vegetable group members have received training on various agriculture skills like fruit tree management, land development, agriculture machinery and operation etc. through Agriculture research centers in Wengkhar and project in the past. Those famers are implementing those set skills in action in their field and shares stories of abundance in harvest.

After witnessing the success stories of our farmer with the aid from CARLEP project, local government office has been prioritizing plans and budgets to enhance agriculture industry in our geog. In 2020-2022 we have been focusing our target on mitigating human wildlife conflict by supporting the farmers with installing electric fence, supplying disease and pest resistant seeds and pesticides. This coming fiscal year, we have prioritized land development activity as flag ship project. In the future we are also planning to aid our farmers with chain link fencing as well.

3.19.6. Mangmi

Human-wildlife conflict is a significant issue in certain parts of the community. These areas require government intervention to encourage farm workers to utilize land resources. Where chain-link fences have been constructed, there has been a noticeable resurgence in farming activities. Community members are willing to work hard on mass vegetable production, but they face challenges due to uncertain market facilities for selling their agricultural produce. Dairy production is thriving in the area and enjoys good market accessibility. It is a crucial farming activity that

provides substantial cash income for farm workers. Dairy farmers remain optimistic about the possibility of receiving higher prices for their products in the near future.

Prioritizing land development programs is essential, as these initiatives are expected to yield impactful results in the future. While pest issues are not commonly reported in the community, preparedness for potential outbreaks is necessary. Livestock diseases, such as the outbreak of Lumpy Skin Disease (LSD), have created significant challenges for livestock farmers. Therefore, prioritizing measures to counter such situations is crucial. Given that all local government programs are implemented within the community, involving local governments in project planning and implementation is essential, as they possess the best knowledge of the area. Initiating the Community Engagement Platform (CEP) concept in all gewogs is vital for ensuring people-centric planning. The 'Nangzom' concept involves monthly casual meetings of CEP group members, including women, persons with disabilities, youth, and individuals from all walks of life, to discuss problems, issues, and planning needs.

The community is experiencing the impacts of climate change, necessitating the development of climate change adaptation programs to cope with the evolving climatic patterns. Extension services, particularly those related to livestock, are crucial for farmers. These services need to be prioritized and effectively delivered to support agricultural activities. While farmers' training is important, there are other programs that require higher priority. Despite numerous training sessions conducted in the past, tangible impacts on the community are not evident. Projects, whether government-funded or externally funded, should be implemented in close consultation with local governments to ensure their success and alignment with community needs.

3.19.7. Kharphu Tshogpa Kinzang Choden)

According to Tshogpa, the loss of harvest due to wildlife incursions has led to decreased production, ultimately discouraging farmers. Consequently, many farmers have abandoned their land, leaving it fallow. Marketing issues have led to a significant decrease in vegetable production compared to previous years. Local markets, including schools and institutions, are already contracted with farmers' groups, preventing individual farmers from selling their produce effectively. Dairy products are in high demand, resulting in fewer marketing issues compared to other agricultural products. However, there is insufficient production to meet the demand.

The Sustainable Land Management Project (SLMP) was previously implemented but largely failed due to the rugged terrain, steep slopes, and farmers' inability to adapt to new techniques. Pest and disease management is a prevailing issue, but due to religious beliefs, many farmers do not use pesticides even when recommended by agricultural extension services. Only a few farmers apply pesticides during peak infestations. All local government (LG) members are involved during the planning period of projects. Decisions made by women are often overlooked by men in the locality, discouraging women from participating in important social events and meetings. If the views shared by marginalized sections were accepted and encouraged, it could lead to more solutions and fewer conflicts.

Climate change presents both advantages and disadvantages. On the positive side, crops like oranges and avocados are now growing in temperate villages, benefiting farmers. However, traditional crops that were previously grown and harvested for consumption are no longer viable in the same regions. Extension services are available on call and are generally satisfactory. Training on using mini power tillers has helped farmers enhance vegetable production and motivated them to work more. The provision of mulching plastics has increased production during winter and reduced labor requirements.

In the past, farmers lacked the ideas and technologies needed to improve their livelihoods. Integrating lessons from the CARLEP project can help poorer farmers gain new insights and work towards improving their financial situation, thereby contributing to the national economy.

3.19.8. Agriculture Aggregator

Rinzin Wangchuk has been involved in the business of aggregating and trading vegetables and fruits for five years, starting in 2019. On a monthly basis, he aggregates significant quantities of produce, including 5 tonnes of potatoes, 400 kg of cabbage, 300 kg of broccoli, and 400 kg of cauliflower. The business has proven profitable due to market demand, with a profit margin of Nu.10 per kilogram. Wangchuk has received support from projects such as CARLEP, including four greenhouses with drip irrigation packages.

The business presents opportunities by collecting and selling local produce, which benefits local farmers. However, there are issues and challenges, including competition from grocery shops and other retailers selling cheaper Indian vegetables. Additionally, there is a disruption in market demand and supply due to high production during the peak season and no production during the off-season

The market-led production interventions under the dairy value chain can be considered key success factors in the project. The expansion of individuals and small dairy groups, as well as the formation of new potential groups, are notable achievements. The provision of inputs such as improved breeds and materials for shed construction motivates and encourages these individuals and groups. The establishment of Milk Collection Centers (MCC) and Milk Processing Units (MPU) in strategic locations has also facilitated the process. The availability of a market, particularly through partnerships like with Kofuku, has been a driving factor for this success. The project's well-connected system of input support, production, transportation, and market availability has been instrumental in achieving these outcomes.

In contrast, the agriculture and vegetable program face challenges despite receiving necessary support. Marketing agricultural produce is more complex than marketing dairy products, largely due to competition with cheaper Indian vegetables. The permaculture program, although highlighted, has not been well understood or effectively initiated. This indicates a need to reconsider its continuation or to enhance understanding and implementation strategies.

3.19.9. Aggregators

Mr. Rinzin Wangchuk from Mongar Pathpari is an aggregator for 14 years here at Mongar vegetable market. He brings one Jumbu track tip per week from India Falakata with all kinds of vegetable and fruits except banned vegetables by the Government since 2016. He supplies vegetables and fruits to other vegetable sellers at Mongar vegetable market as per the demand made before importing from India and also, he supplies to other local vegetable market like Yadi, Gyelposhing, Autsho, Lingmethang and Lhuntshi Vegetable market. During winter time Jumbotruck can carry 12 tonnes whereas during summer time it can carry 8-9 tonnes due to rainy season and road blocks. He also buys vegetables from Mongar villages during peak season and during the time of highway road block. He as an aggregator, has good opportunity to make income and benefits his service to the public from vegetable shortage. From one Jumbu truck tip, he said he could make or save Nu: 25000/- as net profit. Annually he can earn Nu:800000.00/- (Eight lakhs) from the vegetable sales. During his time as an aggregator, he faced problem with high BIT tax collection annually. Thereby if the relevant agents could help him to reduce BIT taxation since some of the vegetables and fruits are highly perishable. Lastly, his support, planning or recommendation is urgent need of one vegetable store to keep vegetables and fruits in the stock which are little longer shelf life.

3.19.10. Lhuentse (DLO)

Lhuentse, district rich in religious and cultural heritage, traditional livestock activities are often avoided due to cultural and religious beliefs. However, non-sentimental livestock activities such as dairy farming are deemed suitable and beneficial, particularly given the favorable climatic conditions for dairy production. Dairy breed intensification programs, including artificial insemination and cattle sourcing, have positively impacted the locality, enabling residents to earn a substantial income through milk supply to dairy processing units and the sale of dairy products.

As Lhuentse is one of the remotest districts with predominantly marginal farmers, the cost of essential materials for dairy farming is often prohibitive. The provision of dairy shed materials significantly benefits the welfare of dairy cows and improves the sanitation of dairy farms, leading to clean milk production and increased dairy output. This, in turn, enables farmers to earn a better income, enhance their living standards, and strengthen the socio-economic fabric of the country.

Supporting dairy groups through the provision of dairy processing plants and equipment is crucial for the sustainability of dairy farming initiatives. Continuous support beyond the initial establishment phase is necessary to strengthen farmer groups and facilitate the diversification of dairy products. Without ongoing support, these dairy groups may struggle to sustain their operations. Therefore, interventions that include the supply of dairy equipment are essential for the diversification and sustainability of dairy farming in the region.

The success of dairy farming is heavily reliant on the availability of feed and fodder. Despite the genetic potential of animals for optimal production, this potential cannot be realized without adequate nutrition. The support provided by CARLEP-IFAD for feed and fodder development, including the provision of fodder seeds, seedlings, chaff cutters, and banana chopping machines, is recognized as crucial for enhancing animal nutrition and further strengthening dairy development in the region. All CARLEP-implemented project activities have been beneficial for the beneficiaries, and it is recommended that these activities continue unless the project is phased out.

The support provided by the CARLEP OPM team has significantly boosted livestock production systems in the region, contributing to food and nutrition security. To further reduce the financial burden on farmers, it is strongly recommended to ensure the availability of spare parts for dairy processing equipment and biogas appliances in nearby shops. Additionally, facilitating immediate maintenance of dairy processing equipment could greatly reduce unnecessary procurement and the purchase of new equipment in the Dzongkhags.

3.19.11. Trashigang (Deputy Chief DLO)

The animal nutrition program has been highly successful, as it is essential for maintaining animal health, reproduction, and production. This program has ensured the continuity of both the quantity and quality of milk production throughout the summer and winter seasons, providing a steady cash flow to dairy households and securing animal welfare standards. Additionally, it has contributed to environmental benefits. The implementation of dairy value chain infrastructures and equipment, including hygienic dairy sheds, bio-digesters, Milk Collection Centers (MCCs), Milk Collection Stations (MCSs), bulk milk chilling tanks, deep freezers, and milk cans, has significantly enhanced the quality of milk supplied to consumers, extending its shelf-life. These interventions have also improved cleanliness, sanitation, and animal welfare in line with Good Manufacturing Practices (GMP) protocols.

Support for breeding and artificial insemination (AI) inputs, such as cost incentives on hybrid cow supply, sex-sorted semen, and breeding bulls, has yielded visible and tangible outcomes in the farmers' fields, further boosting dairy farming in the Dzongkhag. Training in clean milk production has profoundly impacted dairy farmers by equipping them with scientific, knowledge-based dairy farming practices and quality milk production techniques aligned with improved technology. This training has also helped farmers maintain clean and healthy animals, enhancing the aesthetics of dairy sheds and their surroundings. All current strategies and interventions have been effective and should be continued. No strategies, interventions, or tools are recommended for discontinuation at this time.

To safeguard the scarce resources and time of both the service provider and the households/individuals involved in the implementation of larger activities at the enterprise level, it is recommended to establish a legal agreement between the service provider and the incumbent households/individuals. This legal framework will ensure the smooth and efficient execution of projects and protect the interests of all parties involved.

3.19.12. Lhuentse (DAO)

The efficient irrigation system has proven to be a critical factor in promoting winter vegetable programs and orchards in Lhuentse. Despite the substantial rainfall during the summer, the region faces significant water shortages during the winter. The implementation of an efficient irrigation system addresses this issue, ensuring a stable water supply for agricultural activities throughout the

year. Additionally, during drought seasons, the irrigation system acts as a vital tool for mitigating the adverse effects of water scarcity, as experienced in previous years.

Agricultural Land Development (ALD) activities are essential for the mechanization of both wet and dry lands, which is crucial for the farmers in Lhuentse. ALD facilitates the replacement of manual labor with machinery, thereby enhancing production efficiency in the long run. This mechanization support is indispensable for the farmers, aiding them in achieving higher productivity and sustainability in their agricultural practices.

Given the mandate to produce vegetables beyond self-consumption, there is a substantial demand for vegetables across the country. The promotion of protected agriculture is necessary to meet this demand, as it enhances vegetable production by providing a controlled environment for cultivation. This approach not only increases yield but also ensures the quality of the produce, contributing to the overall food security and economic stability of the region.

To improve the value chain of agricultural products, the promotion of solar drying facilities is essential. Solar drying extends the shelf-life of agricultural products, allowing farmers to preserve their harvest and reduce post-harvest losses. This technology improves the marketability of produce, thereby increasing the income of farmers. By incorporating solar drying, farmers can add value to their products and achieve better financial outcomes.

For farmers to achieve better paddy production, it is imperative to improve the irrigation system not only for wet land but also for dry land. The adoption of the latest irrigation technologies is crucial for enhancing production efficiency and yield. An improved irrigation scheme ensures a consistent and adequate water supply, which is vital for the growth and development of crops. By modernizing irrigation practices, farmers can achieve higher productivity and contribute to the overall agricultural development of the region.

In summary, the success of agricultural projects in Lhuentse is heavily reliant on the efficient irrigation system, land development activities, promotion of protected agriculture, solar drying facilities, and enhanced irrigation schemes. These interventions collectively address the challenges faced by farmers, improve productivity, and contribute to the socio-economic development of the region.

3.20 Focus Group Discussion.

3.20.1. Zordoong Jersey Gongphel Tshogpa under Kangpar Gewog.

The diary group is established in the year of 2021 comprising of total 13 members (9 F & 4 M). As the group activities are on initial stage the group does not have the saving account maintained till now. As per the group members they are not collecting the milk in group due to lack of proper market as well as less production of milk as of now. Moreover, the members do not own more than one jersey cow each and are not much interested in expansion of their herd due to shortage of man power, old age and non-availability of fodder during dry season.

To address the shortage fodder in winter season, Livestock sector has provided support for winter fodder conservation technology by construction silos which is supported by CARLEP. Total of 13 numbers of silos and two numbers of chaff cutters are provided to the group in the year of 2023. With fodder conservation technology, they are able to provide enough fodder during dry season resulting in more milk production compare to the past. They also received support in construction of cow shed through CARLEP in previous year.

As of now there is no marketing of dairy products in group. Most of the time it's self-consumed or sold within the local vicinity. 'Although there are future opportunities in dairy, we don't see youth taking part in livestock and dairy development activities even with support from Government or another projects says Sonam Zangmo of Chemshara village. She also does not know how she will be able to rear the cattle from now due to old age and health issues. Looking at the current scenario the group share the concern of group being non-functional as there is not much of income generation from dairy. And most of the younger generation are moving to urban areas looking for other opportunities. So, to address these issues there is need of more support in rural area so that youths can take up livestock and agriculture to higher level.

3.20.2. Khurichilo Chirphen Tshogpa

Khurichilo Chirphen Tshogpa, an integrated dairy and vegetable group comprising 35 members, was formally established on August 7, 2009. Over the years, the group has accumulated savings amounting to Nu. 100,000 in their joint group account. Initially focused on selling milk, they have diversified into processing local cheese and butter, expanding their market offerings. Initially collecting 40-50 liters of milk, their current collection stands at 35-40 liters. The group received pivotal support in the form of winter fodder seeds and equipment such as deep freezers and a cream

separator machine, significantly reducing fodder shortages during winter and minimizing spoilage and rancidity of dairy products.

Despite challenges posed by rural-urban migration leading to labor shortages, the group remains committed to farming, particularly with enhanced cattle sourcing to scale up production. They emphasize the need to mitigate migration rates to ensure their farm's sustainability. Marketing their milk and dairy products has been seamless, facilitated by local markets, school feeding programs, and urban markets.

The group boasts significant female participation, with 31 out of 35 members being women; however, youth engagement is lacking. They actively pursue opportunities to learn new technologies and improve their dairy farming practices. Challenges such as labor-intensive care requirements and fodder shortages during winter persist for larger herds, but the group remains optimistic about expanding market reach and enhancing production quality through new technologies. Climate change impacts, such as the outbreak of diseases like Lumpy Skin Disease among cattle, have added complexity to their dairy farming endeavors. Regarding ownership and management of value chain infrastructure, the group holds ownership while operators handle milk collection, byproduct processing, and infrastructure management.

The CARLEP Project has significantly transformed agriculture and dairy sectors in the community, making agricultural activities the primary income source for rural smallholders. Interventions like greenhouse provisions for year-round vegetable cultivation and technological advancements in dairy farming have reduced labor demands and improved productivity. The community particularly values interventions like greenhouse supply and winter fodder seed distribution for their tangible impact and utility. Overall, the support from CARLEP has enhanced livelihoods, ensured income security, and facilitated sustainable agricultural practices among rural communities, reflecting a positive impact on the local economy and community well-being.

3.20.3 Wamrong Vegetable Group

Wamrong Vegetable Group based in Wamrong_Tshogonpa Chiwog under Lumang Gewog has been functional for almost 10-12 years. The group has a total of 23 members with 22 females and 1 male. As per the chairman, the group has a savings of about Nu. 70,000-80,000. The group diversify their vegetable products by selling it to the middle-man, aggregator and through school and farmers linking program. Through the savings in the group account, the members also provide loan service

to their members in need and also to other community people. With 2% interest to the members and 3% interest to other non-members, the group members provide the loan services. The group members had all grown their own crops individually in their own farms. Most of which are cole crops, root vegetables, legumes and chilies.

The group members were not interested in the expansion of collective farms or leased together with the members because of the past experiences with conflict within the members. Some of the members received greenhouses from the Project. As per the members, they enhanced their vegetable production because of greenhouses and were able to make profit out of it and was able to enhance their livelihood. Some of them also gained cultivation knowledge and techniques through trial and errors. The group members believe they can sustain the group in the future too. Marketing of vegetables is facilitated by middle-man and aggregators

As of now, the group has not even a single youth and in contrast 80% of the members are women. Opportunities in vegetable farming include livelihood enhancement, financial gains and healthy lifestyle. On the contrary, challenges are also faced in vegetable farming and the challenges are human-wildlife-conflict, pest infestation and irrigation issues (No storage for water in open field). In the very future, the group aspires to increased production, high-value crop farming and mechanized farming.

Impact of climate change are also felt in dairy farming and they are weather and climate has changed since the past and “More sub-tropical climate” in the last few years. Oranges can be grown in the region. Farmers are content with the project life changing support and furthermore, they recommend and suggest smart irrigation techniques for vegetable farming to offset water issues, syntax and drip sets, available seeds all year round and fencing for mitigating human-wildlife conflict.

3.20.4. Ngatshang Gonor Detshen

Ngatshang Gonor Detshen, formed in the year 2010. They have a group savings of Nu.323000. Ngatshang Gonor Detshen Chairman stated that after the group has been linked with KIL, sale of Cheese and butter have been banned and no profit is generated to the group. The Group had planned to convert raw milk to cheese, ice cream and yoghurt before it was linked.

Initially, when the group was formed in 2019, they collected around 150 liters of milk per day. Currently, the collection volume has increased to 200 liters per day. Regarding the group's interest in herd size expansion, a member from the Thmubari Gonor Group indicated that the herd size might increase if the group functions well. The group has received substantial support from the project, including the provision of dairy equipment and other resources. This support, coupled with a 30% subsidy for cattle, has proven economically efficient and has generated increased income for the group members.

In terms of sustainability, there has been a sharp increase in consumer demand for cheese and butter. As a result, members are reluctant to supply raw milk to KIL, as home-processed dairy products fetch higher income. The long-term supply of milk to KIL is also uncertain. Marketing practices show that half of the dairy group members sell raw milk to Chenanri. Both youth and women actively participate in the group's activities.

The group sees opportunities in dairy farming, particularly with the introduction of technology such as milking machines that can handle between 5 to 10 liters of milk, which would increase production. However, they face challenges such as a lack of land for pasture development, feed shortages during the lean season, and limited access to artificial insemination facilities. The group also expressed a desire for training on improving cattle productivity and a consolidated extension to raise awareness about the use of improved forages. Climate change is another concern, as changes in temperature and humidity, along with extreme cold in winter, are likely to affect milk production.

Regarding ownership and management of dairy value chain infrastructures, the KIL company directly procures raw milk from dairy group farmers in Ngatshang, Thumbari, Phanas, and Yadi GONOR detshen. Using its own infrastructure and hired vehicles, KIL makes monthly payments of around Nu. 35,000 to 40,000, purchasing approximately 200 to 300 liters of milk at a fixed rate of Nu. 38 per liter.

The community has benefited significantly from the CARLEP project, which has been deemed successful in meeting all agreed requirements, finishing on time, and staying within budget, according to a member of the Yadi Dairy Group. The project interventions have improved income, employment, and production while also helping to involve the poorest and most marginalized families, as stated by Mr. Norbu, the chairman of Ngatshang GONOR. For future efforts, the Ngatshang Dairy Group suggests that the project should support the provision of a milk van for transporting raw milk to the MCC.

3.20.5. Khengzor Tshesay Detsen

Khengzor Tshesay Detsen comprises of 7 members and was initially formed in 2019. The group has a group saving amounting to Nu. 20,000. As a part of business diversification for multiple income sources the group has diversified its agricultural activities from Vegetable Production focusing on various types of high value vegetables. Moreover, improved Production Techniques such as supply and implementation of greenhouses to enhance production efficiency. The group cultivates a variety of vegetables, including chili, potatoes, tomato, onions, beans, broccoli, cabbage and cauliflower

The group is keen on expanding its vegetable farming operations. However, this expansion is contingent on receiving government assistance. Essential areas of support include subsidies for greenhouse construction, to enhance controlled environment farming, seed procurement, to access high-quality seeds for better yield, irrigation system installation to ensure consistent water supply and mitigate risks associated with water scarcity. The group has received substantial support from a project, which includes: Greenhouses providing a controlled environment for cultivation, extending growing seasons, and protecting crops from adverse weather. High-Quality Hybrid Seeds leading to higher yields and improved crop quality. Improved Irrigation Facilities to ensure consistent water supply and boost crop yields. This support has significantly enhanced production and income generation for the group. The Khengzor Tshesay Detsen vegetable group demonstrates strong potential for sustainability. Key factors contributing to long-term success and viability include:

- Effective resource management.
- Adoption of modern agricultural practices.
- Continuous improvement in production techniques.

The group markets its produce through several channels, ensuring wide distribution namely Khengzor school, local community and Denchi. These marketing efforts optimize accessibility and promote community engagement, thereby enhancing market reach and economic sustainability. The group is primarily composed of female members, with a few adult males also participating. This

composition underscores the significant role of women in the group's operations and decision-making processes.

3.20.6. Chali Vegetable Group

Chali vegetable group was established in year 2018, with 7 members consisting of 2 males and 5 females. The group also have saving account in Bhutan Development bank. The group deposited a certain percentage of their total profit in the saving account as their future saving for group's developments. The groups mainly focus on vegetable production like cole crops. The groups also cultivate Yangtsepa variety maize and give seed supply to National seed center, Yangtse.

The member of the group wants to increase the productivity of the vegetable group but due to lack of market and short shelf life of the vegetable becomes a challenging issue to the group. Though there is supply of seeds and support from the projects labor shortage is one of the key factors to the vegetable production as all the young youth are opting for greener jobs rather than taking up the agriculture as their profession.

Starting from the year we started till now; vegetable production has been good source of income for the family but now with aging population there is chance of shrinking groups to lesser numbers. Till now groups have received Seeds, Equipment's like sprinkler, green house, sin tanks and flexible pipe from the CARLEP project which was great help for the farmer to them. Regarding the youth engagement in the vegetable group, there is very little chance of taking vegetable production by the growing youths as most of youths looks for clean job. Some of the challenges faced by the group while functioning was as follows;

1. Climate condition
2. Labour
3. Pest and disease
4. Irrigation
5. Less viability of seeds.
6. Wild life

Climate change have greater impact on vegetable production as more occurrence of pest and disease are coming up. Water sources are drying up and soil are becoming less productive as compared to olden days. Uncertain hail and wind storm damages the yield of the vegetables during the flowering stage. Pest and disease are one of the interests losing factor for the farmers as we being Bhutanese, we hesitate to use insecticide which is one of the factors were most of our farmer lose their farm produce to the pest and left with less production and more expenditure.

3.20.7. Thamnangbi Om Tshongdril Namlay Tshokdey

Thamnangbi Om Tshongdril Namlay Tshokdey is a dairy group consisting of 18 members (9 Female and 9 Male) and the group was initially formed in 2001. Currently, the group collaboratively owns a total group savings of Nu.3,30,000. Apart from dairy production activities, the group is not engaged in any other economic activities. However, their business diversification is not due to lack of interest among the members in the group. As shared by one of the members, the group is keen on doing other economically active activities provided they have the right size of members in the group, it will be quite comfortable with the present working environment although we couldn't focus on diversification of dairy products. However, they are linked with a youth group that focuses on product processing and uninterruptedly supply the milk about 200-250 liters daily. Therefore, they don't have a concrete plan to diversify their business other than focusing on the current line of business. Initially they collected 40 liters/day and currently they are collecting 200 to 250 liters/day.

The group member rear improved breed of cattle and they don't plan on expanding the herd size as they can only manage the current size of the farm. The group is a recipient of project supports on capacity development, equipment and other subsidized supports. The group's function and dynamism had improved through the projects support and there is a significant impact on livelihood of the group members. The incidences of management related diseases like; mastitis, ketosis, acidosis and bloat were significantly reduced. Likewise, group members had become equally competent to manage the group.

The group is committed to function sustainably as a group. They said that they will ensure to supply the milk to the youth group and other aggregators like KIL, Chenari in future. The group had been grappling with aging population of group members and youths migrating to towns for the better opportunities. Such factors may impede in sustainability of the group in near future. So as to market their produce, groups directly supply the whole milk to youth group which is a dairy product processing group. In regard to gender participations, the educated youths hardly engage in agriculture

and livestock enterprises. However, in gender participation parse, there is equal representation of members in the group functions. Many opportunities are seen in dairy farming. The scope and opportunities in dairy farming

- Breed intensification through AI outreach (CAIT)
- Sale of good quality heifers and breeding bulls.
- Increase in volume of milk for sale (The group's daily collection had once peaked at 400-450L)

However, the community is in dire need of community AI technician as the current CAIT stationed at Yakpugang faces difficulty in AI coverage. Although, there is no formidable challenges encountered in dairy farming although the group grapples with scarcity of feed and fodder resources during the lean seasons. With changing times, most groups encounter challenges in meeting the quality standards of milk and milk products. However, group always strives to embrace the good husbandry practices. In the near future days, the group plan on expansion and diversification of the group's existing business.

Impact of climate change on dairy farming

- Heat stress
- Drying up of open water source for grazing animals
- Change in availabilities of fodder resources

The group always commits to care and take ownership of the equipment and infrastructures supported by government/project. Through the series of project support, the group witnessed many positive changes in the community ensuring significant change in livelihood. In the field of livestock and agriculture, it has resulted in some visible outcomes like

- Availability of improved horticulture crops and vegetables in market
- Reclamation of fallow land and conversion into improved pastureland
- Intensification of breed improvement activities through cross breeding and AI outreach services.

Amongst numerous project interventions provided to farmers, all project interventions of different scale were felt important and impactful. However, capacity development and infrastructure support were found most useful and impactful. Further, programs like; field visits, exposure tours,

exchange programs and farmers field festivals were perceived to be an effective tool of approach to bring changes to farmers/groups.

3.20.8. Takchu Sanam Nyamrub Detshen. (Vegetable Group)

Vegetable production in the country as well as here at Mongar Dzongkhag has been gradually increased after the country faced Rupee shortage in 2012. Vegetable production increases after formation of farmers' group as well as individual household wise through nutrition value and it has become major source of income to our rural farmers.

In that way, now the agriculture sector and CARLEP has started the commercialization program for vegetable cultivation, export of vegetables also has been increased, all chiwogs and geogs are cultivating year-round vegetable production, to ensure continuous supply of vegetables in the country and to reduce dependence on imported vegetables.

So, through our Agriculture sector, CARLEP Wengkharr and Horticulture division side some subsidy on production inputs like free supply of seeds, irrigation facilities and cost-sharing scheme for greenhouses will be continued for a few years and be withdrawn phase wise. Konbar-Takchu Chiwog has 68 households and is 15 km away from Mongar Town. From the Chiwog they have formed one vegetables group in the year 2012 with 11 members (10 Female and 1 Male) as Takchu Sanam Nyamrub Detschen chaired by woman.

The group is very progressive and they have made bylaws for smooth functioning within the group members. They grow all variety of vegetables and is linked with Konbar Community School in the year 2020. They raise seedling as nursery in one greenhouse together and when the seedling is ready to transplanted, they divide the seedling equally and transplanted in their own field. They have made saving amount Nu: 205344.00 (Two lakhs five thousand three hundred forty-four only) in 2020, they give loan within members' amount ranging from Nu: 10000-20000/- with a condition to repay within a year without interest. Some amount they have divided as it was in need for schooling and other purposes. At present they have Nu: 27996.00 (Twenty-seven thousand nine hundred ninety-six only) in their saving account. This vegetable group is registered with RAMCO office and their registration no. is FG-130.

The group members are now cultivating more vegetable in increased areas than before since they have good business opportunity to sell their produces in school (school linking program), market individually to local vegetable market in Mongar and also sell to the traders to export outside

Dzongkhag like Bumthang, Ngalam and Thimphu. They made cash income from vegetables as an average Nu: 50000-100000/-annually by the members. Support received from CARLEP project were for vegetable seeds, sprinkle, water can and syntax. The challenges faced by the group members during vegetable farming are some pest and diseases damage, wild animals and insufficient irrigation (Water). For vegetable cultivation most of the farmers don't use chemicals and fertilizers rather than using farm yard manure (FYM) to control from climate change. Finally, the group is very positive and willing to sustain in the future. Plan, Suggestion and recommendation are needing support for Greenhouse, Potato chip machine sets and vegetable farming inputs. Hence, Vegetable production donates good income and improve livelihood.

3.20.9. Kedhikhar Sanam Nyamrub Detshen. (Women Group)

Kedhikhar Chiwog has 74 households and is 5 km away from Mongar Town. From the Chiwog they have formed one vegetables women group in the year 2017 with 7 members (all Female) as Kedhikhar Sanam Nyamrub Detshen chaired by woman.

The group is very progressive and they have made bylaws for smooth functioning within the group members. They grow all variety of vegetables and are linked with Kedhikhar Middle Secondary School in the year 2019. They raise seedling like chili, Cole crops as nursery in the four greenhouses together and when the seedling is ready to transplanted, they divide the seedling equally and transplanted in their own field, even some chili seedlings are sold to the farmers within their locality. They have made saving amount Nu: 50,000.00 (Fifty thousand only) in 2022, they give loan within the members ranging from Nu. 5,000-10,000/- and have to repay within a year without interest. Some amount they have divided as it was in need for schooling and other purposes. At present they have Nu: 26,000 (Twenty-six thousand only) in their joint saving account.

The group members are now cultivating more vegetable with increased areas than before since they have good business opportunity to sell their produces in school (school linking program), market individually to local vegetable market in Mongar and also sell to the traders to export outside Dzongkhag like Bumthang Ngalam and Thimphu. They also cultivate off-season vegetables inside the greenhouse like tomatoes and chili. They made cash income from vegetables as an average Nu: 50000-300000/-annually by the members. Support received from CARLEP project were training on tomato cultivation, vegetable seeds, sprinkle, water can and syntax. The main challenges faced by the group members during vegetable farming are some pest and diseases damage, wild animals and

insufficient irrigation (Water). For vegetable cultivation most of the farmers don't use chemicals and fertilizers rather than using farm yard manure (FYM) to control from climate change.

Finally, the group is very positive and willing to sustain in the future. Plan, Suggestion and recommendation are needing support for Greenhouse, Potato chip machine sets and vegetable farming inputs. Hence, comparative advantage of vegetable growing by the group over other crops, employment opportunity, high income prospects and plans helps to bring up good vegetable business in the country.

CHAPTER 4: ANNEXURES

4.1 Checklist for Key Informant Interviews and Focus Group Discussion

Objectives:

The main objectives of the group discussion and key informant interviews are:

- Discuss the impacts of the project implemented activities through seeking their views and perceptions.
- To identify social impacts and issues
- To identify the needs and priorities of rural smallholders and intensify the support
- To unfold the current status of the beneficiaries and have a comparative data before and after the project intervention
- To collect the gender aggregated data especially on the education level and the issues faced based on biases in gender
- To find out the participation of the rural households in project activities and their rate of adoption.

A. Focused Group Discussion (FGD)

1. Conduct FGD with a dairy group or cooperative comprising of group executive and few members (desirable to have more participants in a group). Ask the following open-ended questions:

- Name of the group and number of members, group formation year
- Group savings
- Business diversification
- How much milk was collected initially when group was formed and what is the current collection volume
- members interest in herd size expansion
- Support received from the project and was it beneficial in terms of production enhancement and income generation
- Sustainability of the group
- Marketing of the milk and or dairy products
- Youth and women participation
- Opportunities in dairy farming
- Challenges in dairy farming
- Future outlook of a group
- Impact of climate change on dairy farming
- Ownership and management of dairy value chain infrastructures
- What effect, if any, do you feel the project had on the community in which you live? Please describe
- What project interventions did you think were the most useful to you as a small farmer
- Suggestions and recommendations (What recommendations do you have for future efforts)

2. Conduct FGD with a vegetable group comprising of group executive and few members (desirable to have more participants in a group). Ask the following open-ended questions:

- Name of the group and members in a group, group formation year
- Group savings
- Business diversification
- Type of vegetable grown
- Group members interest in expansion of vegetable farm
- Support received from the project and was it beneficial in terms of production enhancement and income generation
- Sustainability of the group
- Marketing of the vegetables
- Youth and women participation (Women leadership)
- Opportunities in vegetable farming
- Challenges in vegetable farming
- Future outlook of a group
- Impact of climate change on vegetable farming
- Suggestions and recommendations

3. Women group (Veg or any other women groups)

- Type of group
- Establishment year
- Name of the group
- Literacy of the group executive and members
- Group savings
- Support received from the project
- Sustainability of the group
- Marketing of the produce or product
- Group dynamics
- Membership expansion
- Issues and challenges
- Suggestions and recommendations

B. Key Informants Interview

1. Interview at least one agricultural entrepreneur (Livestock/Agriculture) from the randomly selected gewogs and ask the following questions:

- How is it to be an agricultural entrepreneur in the country? (Open ended question)
- How long have you been into this business?
- Are you making a living from your enterprise alone or do you have other source of income?
- Do you think that your enterprise is profitable and sustainable?
- How do you see your enterprise 5 years down the line?
- Opportunities and challenges
- Recommendations/suggestions

2. Interview at least one local government leader (Gup/Mangmi/Gewog ADM/Tshogpa) and ask the following open-ended questions:

- Human wild-life conflict
- Views on vegetable production and marketing in the gewog
- Views on dairy production and marketing in the gewog
- Land development practices and its impact
- Pest and diseases
- Involvement of Local Government in Project planning and implementation
- Village decision making by poorer households and women-headed households
- Climate change
- Extension service delivery
- Farmers training and its impact
- Integrating CARLEP lessons and success into local government plans

3. Interview at least one or two aggregators or traders or middle men (both livestock and Agriculture) from the gewog and ask the following open-ended questions:

- Name of the trader/aggregator
- No. of years into the business
- Type of products aggregated and traded
- Quantity aggregated or traded
- Is it a profitable business?
- Profit margin per kg or per MT
- Support received from CARLEP or any other projects

- Opportunities, issues and challenges

4. Interview with Koufuko International Ltd. and ask the following questions:

- Current volume of milk collection and processing
- No. of groups supplying milk to the plant
- Marketing of the products
- Milk collection trends
- Profitability of the plant
- Future expansion plan
- Corporate social responsibility
- Profit plough back mechanism
- Issues and challenges

5. Interview with milk transporters

- Name of the transporter
- How long have you been transporting milk?
- From how many farmer groups do you collect milk
- Monthly income
- Maintenance and fueling of cars
- Income from transporting business
- Issues and challenges
- Suggestions and recommendations

6. KII with DLO and DAO

- Which of the project strategies and interventions would you consider to be key success factors? Please explain
- What strategies, interventions, tools should be discontinued and why?

4.2 Annual Outcome Survey (2023) Questionnaire

QUESTIONNAIRE ID: _____	
ANNUAL OUTCOME SURVEY 2023	
I.	Date (DD/MM/YY): _____
II.	Name of the enumerator: _____

Note for enumerator: Before starting the interview, introduce yourself, mention that you are representing CARLEP, under MoAL. Explain the objectives of the survey and state that the any response provided shall be strictly confidential.

Ask the person if he/she consents to respond to the questions. If not, go to the next household. choose the answer from the options given

A – HOUSEHOLD INFORMATION		
A.1	Dzongkhag: _____ Gewog: _____ Village: _____	
A.2	A.2.1. House No.: _____ A.2.2. Thram No.: _____	
A.4	Name of the Respondent: _____	
A.5	Gender of the Respondent	1. Male 2. Female
A.6	Age of respondent _____	
A.7	Are you the head of the Households	1. Yes 2. No
A.8	Gender of the household head	1. Male 2. Female
A.9	What is the highest level of education	1. Post Graduate 2. Graduate 3. Higher secondarySchool 4. Middle SecondarySchool 5. Primary Education

	attained by the respondents?	6. Non-Formal Education 7. Monastic School 8. Illiterate
A.10	Total area of Dry land a household owns	Under cultivation _____ Acres
A.11	Total area of dry land a household owns	Fallow _____ Acres
A.12	What is the reason for fallow dry land	
A.13	Total area of wet land a household owns	Under cultivation _____ Acres
A.14	Total area of wet land a household owns	Fallow _____ Acres
A.15	What is the reason for fallow wet land	
A.16	Do you have a land leased in or leased out	1. No 2. Yes, leased in 3. Yes, leased out
A.17	Area leased out _____ acres	
A.18	Area leased in ____ acres	

SECTION B: HOUSEHOLD INCOME AND LIVELIHOODS STATUS

1. What is the average income (Annual) of your household in Ngultrum from the following source?

Income sources	Income (Nu.)
1. Cash crop 2. Cereals 3. Enterprise 4. Fruit crops sold 5. Farm labour /off farm activities wages earned 6. Livestock (Dairy products sold only) 7. Pension received 8. Sale of Vegetables 9. Salary earned 10. Livestock (Poultry, goat, Piggery, Fishery, etc. 11. Remittances received 12. Processed products sold 13. NWFP Collected and sold 14. Others	

2. Did your household produce enough cereals to feed your family for whole year (2023)?	Yes	No
3. Did your household produce enough Vegetables to feed your family for whole year (2023)?	Yes	No
4. Did your household produce enough Dairy products to feed your family for whole year (2023)?	Yes	No
5. For how long, did Staple Cereals your household produced lasted?	Months _____	
6. For how many months in a year, does your household remain self-sufficient in vegetable (exclude potato if produced in commercial level)?	Months _____	
7. For how many months in a year, does your household remain self-sufficient in dairy products?	Months _____	

Annual Outcome Survey

2023-2024

8. Over the last 12 months (2023), was there any period(s) during which, 3 meals a day was difficult for your family? (food shortage periods)	Yes	No
9. In which of the twelve months, did your household face food shortage?	Months _____	
10. Was there any improvement as compared to previous year (2022)? (Some Improvement/Same/Situation is worse)		
11. What is your household's average monthly expenditure? (Nu.)		
12. List three major expenditure made by your household in 2023. (Rank in order.)		
13. Did you avail loan for agricultural purposes (ONLY)?	Yes	No
<p>8. 14. If yes, why did you avail loan?</p> <ul style="list-style-type: none"> • To purchase improved cattle • To construct cattle shed • To purchase chaff cutter • To purchase Milk Can • To start poultry / piggery/ fishery/ goat farming • For Mushroom Intensification • For Greenhouse, meshnet and polytunnels establishment • For construction of biogas digester • For vegetables seeds • For cash crop cultivation • For orchard development • Land Development • For buying farm machineries • For farm supplies and equipment, eg: seeder, fertilizer spreader, weeder etc • To establish Agri-enterprise • For Fencing • For Agri-infrastructure like Curing Shed, Collection shed...etc • For Pasture Development • Others 	<p>Specify _____ if 'other' Loan amount. Loan amount has to be greater than Nu.10000</p>	

SECTION C – PARTICIPATION IN PROJECT ACTIVITIES

1. Did you or your family member involve in any activities related to CARLEP in 2023?	Yes	No
2. In which of the following activities were you (or any member of your household) involved? (Any activities supported by CARLEP, RGoB and other projects) <ul style="list-style-type: none"> ✓ Farmers Training ✓ Vegetable Production (inputs and equipment) ✓ Dairy Development (inputs and equipment) ✓ Marketing and Agri-business (record and book keeping...etc. ✓ Irrigation Canal Renovation ✓ Multi-use Water Scheme ✓ Efficient irrigation system (Drip System) ✓ Lead Farmer or Farmer-to-farmer training ✓ SLM and Land Development ✓ Others 		
3. In general, how would you rate your satisfaction to any of the project activities that impacted your livelihood. <ul style="list-style-type: none"> • Highly satisfied • Moderately satisfied • Not satisfied 		
4. Did you or your family member involve in any other project(s) activities other than CARLEP support (2023)?	Yes	No
5. Did you receive support for environmentally sustainable and climate resilient technologies and practices during 2023?	Yes	No
6. If yes, choose the support received from the following list <ul style="list-style-type: none"> ➤ Land management ➤ Fodder slips ➤ Mushroom ➤ Upland paddy ➤ Improved pasture seeds ➤ Native poultry ➤ Stress tolerant vegetable seeds ➤ Rain water harvesting ➤ Efficient irrigation 		

Annual Outcome Survey**2023-2024**

7. Have you adopted the above activities?	Yes	No
8. If no, what are the reasons for non-adoption?		

SECTION D: AGRICULTURAL PRODUCTION AND IRRIGATION

1. Do you grow vegetables?	Yes	No
----------------------------	-----	----

Vegetables	Production in 2023 (Kg)	Quantity Sold (Kg)	Amount Earned (Nu.)
Radish			
Carrot			
Broccoli			
Tomato			
Onion			
Cabbage			
Beans			
Asparagus			
Chilli			
Peas			
Cauliflower			
Others			

2. What is the total area under vegetable cultivation? (excluding winter vegetables grown in paddy fields) (in Acres)

3. During the past 12 months, what are the agriculture production technologies you or your household adopted?	
✓	New Vegetable Production techniques
✓	Post-harvest Technologies
✓	Plant Protection
✓	Farm mechanization and Land Development
✓	Soil and Water Management
✓	Greenhouse and Poly-tunnels
✓	Drip Irrigation
✓	Sprinkle Irrigation
✓	Composting (Heap compost or vermicomposting)
✓	Solar Dryer
✓	Others
4. List down other Technologies	
5. Do you have cattle? (Yes/No)	
6. How many numbers of improved breed of cattle do you have?	
7. How many numbers of improved breed are milking?	
8. What is the average milk yield of improved cattle breed per day in winter months? (liter/day).	
9. What is the average milk yield of improved cattle breed per day in summer months? (liter/day).	
10. How many numbers of local breed cattle do you have?	
11. How many numbers of local breed cattle are milking?	
12. What is the average milk yield of local cattle breed per day in winter months? (liter/day)	
13. What is the average milk yield of local cattle breed per day in summer months? (liter/day)	
14. During the past 12 months, did you adopt any new livestock production technologies?	
✓	Milk Processing and Packaging
✓	Fodder conservation technology
✓	Clean Milk production
✓	Bio-gas
✓	Improved fodder grass plantation
✓	Winter Fodder cultivation
✓	Improved Cattle shed
✓	Total Mixed Ration
✓	Others
15. Specify others	

16. How many acres of improved fodder grass do you grow?
17. How many acres of winter fodder did you grow last winter?
18. How much fodder did you conserve in 2023? (Kg (s) Silage, Hay, crop residue)
19. How much commercial feeds did you purchase in a year? (Kg (s))
20. What kind of cattle shed do you have? <input type="checkbox"/> Concrete floor and CGI roofing with manger and trough <input type="checkbox"/> Concrete floor and CGI roofing without manger and trough <input type="checkbox"/> Single Roofing without concrete floor <input type="checkbox"/> No proper cattle shed
21. Do you have bio gas plant? (Yes/No)
22. In a day, for how many hours do you use bio gas for cooking <input type="checkbox"/> Less than or equal to 30 Minutes <input type="checkbox"/> 0 minutes to 1 hour <input type="checkbox"/> 1 hour to 2 hours <input type="checkbox"/> 2 hours to 3 hour <input type="checkbox"/> 3 hours to 4 hours <input type="checkbox"/> 4 hours to 5 hours <input type="checkbox"/> 5 hours to 6 hours <input type="checkbox"/> more than 6 hours <input type="checkbox"/> Non-functional
23. What were the source of energy for cooking before bio gas installation? <input type="checkbox"/> Firewood <input type="checkbox"/> LPG Gas <input type="checkbox"/> Kerosene stove
24. Did the use of other source of energy increased or decreased or remained same after bio-gas installation? <input type="checkbox"/> Increased <input type="checkbox"/> Decreased <input type="checkbox"/> Remained Same
25. Did you face technical problems using biogas? (Yes/No)

26. What kind of problems did you face?

- ✓ Lack of skilled operator
- ✓ Poor equipment design
- ✓ Insufficient dung input
- ✓ Labor intensive
- ✓ Gas Leakage
- ✓ Stove Problem
- ✓ Minimal gas production due to cold
- ✓ Far away from kitchen

27. Are you interested to install and use Bio gas? (Yes/No)

SECTION E: IRRIGATION INFRASTRUCTURE

1. Did you receive any support in irrigation from CARLEP? (Yes/No)

2. If yes, has the support in irrigation reduced water shortage in your farm?

- ✓ Not at all
- ✓ Partially
- ✓ Significantly

3. Do you use irrigation (open canal/piped) system for wetland agriculture? (Yes/No)

4. Did the cultivation area under irrigation increased or decreased in last three years?

- ✓ Increased
- ✓ Decreased
- ✓ Remained Same

5. If increased or decreased, quantify the increased/decreased under irrigation. (Acres)

6. Did the productivity of paddy increased or decreased in last three years?

- ✓ Increased
- ✓ Decreased
- ✓ Remained same

7. Did you grow vegetable(s) in paddy field after harvest? (Yes/No)

8. Area under winter vegetable production in paddy fields

9. What types of Irrigation system (dry land) do you use for vegetable production?

- ✓ Pipe Networking System
- ✓ Drip Irrigation
- ✓ Syntax and reservoir tank
- ✓ Sprinkler System
- ✓ Surface irrigation
- ✓ Rain Water Harvesting
- ✓ Hand Watering
- ✓ Rain fed irrigation

SECTION F: WOMEN PARTICIPATION AND DRUDGERY DEDUCTION EQUIPMENT

1. Who mostly operates the agricultural machinery?

Agricultural Machinery	Who operates it		
	Man	Both	Woman
Mills			
Post-harvest machines (Sheller, hullers, oil expeller etc.)			
Dairy Equipment (milk churners, cream separators etc.)			
Chaff cutter			

2. Do you use biogas, chaff cutter and efficient irrigation system or either of these? (Yes/No)

3. If yes, mention reduction in time spent for collecting water or fuel or fodder

- 0-30 minutes
- 30-60 minutes
- 60-90 minutes
- 90-120 minutes
- >120 minutes

SECTION G: MARKETS

1. Do you sell Vegetables? (Yes/No)

2. Is the vegetables marketed in group or individually?

3. Rank TOP THREE market places for Vegetables as per the quantity of sales from the following list. (Excluding auction of cash crops like potatoes....) Following are the list of markets and Items cannot be selected more than once.			
Markets	1 st Choice	2 nd Choice	3 rd Choice
<ul style="list-style-type: none"> Schools and institutions Middle man or regular contract buyer Local Market within short vicinity Thromde Market within the region Local Farm Shops (FCBL) Export to India None 1 Out of the Region 			
4. Do you or your group have a trader or a person who usually buys in bulk to be sold somewhere? (Yes/No)			
5. Has this arrangement improved your access to market? (Yes/No).			
6. What were the three major problems faced by your household in 2023?			
7. What is your solution or suggestion to mitigate above issues/problems?			

THIS IS THE END OF THE INTERVIEW, THANK YOU FOR SPARING YOUR TIME ANSWERING TO US. YOUR RESPONSE WILL BE HIGHLY VALUED FOR THE EVALUATION OF OUR PROGRAMME.

Office of Programme Management

Commercial Agriculture and Resilient Livelihoods Enhancement Programme (CARLEP)

Wengkhar: Mongar



Contact Us at:

Post Box no 146

Tele. No 00975 04 641236

e- Mail: carlep2016@gmail.com

Website: www.carlep.gov.bt

Flx www.facebook.com/CARLEP2016