



Investing in rural people

# ANNUAL OUTCOME SURVEY 2021



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Enhancement Programme

# **Annual Outcome Survey 2021**

**Office of the Programme Management  
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**TABLE OF CONTENTS**

<b>1</b>	<b>BACKGROUND .....</b>	<b>1</b>
1.1	COMMERCIAL AGRICULTURE AND RESILIENT LIVELIHOODS ENHANCEMENT PROGRAMME .....	1
1.2	ANNUAL OUTCOME SURVEY (AOS) .....	1
1.3	SCOPE OF THE ASSIGNMENT .....	1
1.4	THE OBJECTIVES .....	2
1.5	THE SPECIFIC TASKS .....	2
<b>2</b>	<b>TECHNICAL APPROACH &amp; METHODOLOGY .....</b>	<b>2</b>
2.1	LAUNCHING OF THE ANNUAL SURVEY 2020 .....	3
2.2	INDICATORS FOR MONITORING THE IMPACT OF PROJECT .....	3
2.3	INDICATORS FOR MONITORING THE IMPACT – AOS 2020 AND BEYOND .....	3
<b>3</b>	<b>HOUSEHOLD SURVEY &amp; INTERVIEWS .....</b>	<b>4</b>
3.1	SAMPLE SIZE & SAMPLING PROCEDURE .....	5
3.2	KEY INFORMANT INTERVIEWS .....	5
3.3	DEFINITION OF THE STUDY POPULATIONS .....	6
3.4	SAMPLING PROCEDURE .....	6
3.5	TRAINING OF ENUMERATORS .....	7
3.5.1	<i>Pre-testing the survey instruments</i> .....	7
3.5.2	<i>Code of conduct for enumerators of the survey</i> .....	8
3.5.3	<i>Data Quality Control</i> .....	9
3.5.4	<i>Supervision and Monitoring of Fieldwork</i> .....	9
3.5.5	<i>Recruitment of Field Staff</i> .....	10
3.6	DATA COLLECTION- FIELD WORKS – PHASE I .....	10
3.6.1	<i>Household Surveys &amp; Interviews (Lhuentse &amp; Trashhi Yangtse)</i> .....	10
3.6.2	<i>Challenges and lessons learnt</i> .....	11
3.7	DATA COLLECTION: FIELD WORKS PHASE II .....	11
3.7.1	<i>Household Surveys and Interviews: Trashigang, Mongar, and Pema Gatshel</i> .....	11
3.7.2	<i>Challenges and lessons learnt</i> .....	12
3.8	SUPERVISION AND QUALITY CONTROL OF DATA COLLECTION .....	13
3.9	DATA MANAGEMENT: COMPILATION, DATA CLEANING, AND ANALYSIS .....	13
3.10	REPORT PREPARATION .....	14
<b>4</b>	<b>WORK PLAN/ IMPLEMENTATION SCHEDULE .....</b>	<b>14</b>
4.1	FIELD SURVEY IMPLEMENTATION PLAN .....	14
4.2	DELIVERABLES AND REPORTING SCHEDULE .....	15
<b>5</b>	<b>FINDINGS OF THE ANNUAL OUTCOME SURVEY .....</b>	<b>15</b>
5.1	DEMOGRAPHIC PROFILE - (LITERACY RATE AGE AND GENDER) .....	15
5.2	HOUSEHOLD INCOME AND EXPENDITURE .....	16
5.3	HOUSEHOLD INCOME AND EXPENDITURE (DZONGKHAG WISE) .....	17
5.4	LOANS AVAILED BY HOUSEHOLDS .....	18
5.5	FOOD SELF-SUFFICIENCY STATUS .....	19
5.6	LAND USE AND IRRIGATION .....	20
5.6.1	<i>Use of irrigation</i> .....	20
5.6.2	<i>Trends in terms of area under irrigation and crop productivity</i> .....	21
5.7	CROPS AND LIVESTOCK PRODUCTION .....	22
5.7.1	<i>Area and Production of Vegetables</i> .....	22
5.7.2	<i>Cattle Ownership</i> .....	23

5.7.3	<i>Milk Production</i> .....	24
5.7.4	<i>Adoption of Crops &amp; Livestock Production technologies</i> .....	24
5.7.5	<i>Production of improved fodder</i> .....	26
5.7.6	<i>Cattle shed in the Project areas</i> .....	26
5.7.7	<i>Use of Farm Inputs</i> .....	27
5.7.8	<i>Farm Records Keeping</i> .....	27
5.8	MARKETING OF AGRICULTURE & LIVESTOCK PRODUCE.....	28
5.8.1	<i>Marketing and Markets of Vegetables</i> .....	28
5.8.2	<i>Marketing and Markets of Dairy Products</i> .....	29
5.9	SOME SUGGESTIONS FOR MARKETING OF AGRICULTURE & LIVESTOCK PRODUCE.....	31
5.10	BIOGAS PROMOTION .....	32
5.10.1	<i>Households owning Biogas</i> .....	32
5.10.2	<i>Trends in use of other energy sources after the biogas</i> .....	33
5.10.3	<i>Cooking energy sources before biogas</i> .....	33
5.10.4	<i>Efficiency of biogas compared to LPG and Firewood</i> .....	33
5.10.5	<i>Technical problems on use of biogas</i> .....	34
5.11	WOMEN PARTICIPATION IN AGRICULTURE & LIVESTOCK PRODUCTION .....	34
5.11.1	<i>Asset ownership and women participation</i> .....	34
5.11.2	<i>Operation of farm machinery</i> .....	35
5.11.3	<i>Decision making at the household level</i> .....	36
5.12	HOUSEHOLD INVOLVEMENT IN PROJECT ACTIVITIES.....	36
5.12.1	<i>Satisfaction ratings by households on Project implemented activities</i> .....	37
5.12.2	<i>Involvement of households in any other Project activities</i> .....	38
5.12.3	<i>Major problems faced by Households</i> .....	38
5.13	KEY INFORMANT INTERVIEWS MAIN FINDINGS.....	40
5.14	FACTORS CONTRIBUTING TO THE SUCCESS OF CARLEP ACTIVITIES AND SUSTAINABILITY .....	43
5.14.1	<i>Connecting and collaborating with the market chain actors</i> .....	43
5.14.2	<i>Value addition, packaging and post harvest</i> .....	43
5.14.3	<i>Capacity development of entrepreneurs</i> .....	43
5.14.4	<i>Continued Project support to Youth Groups</i> .....	43
5.14.5	<i>Success of CARLEP activities depend on Gewog Agriculture and Livestock Extension</i> .....	44
5.15	KEY ISSUES TO BE ADDRESSED BY CARLEP .....	44
5.15.1	<i>Pricing and consistency in quantity to be supplied</i> .....	44
5.15.2	<i>CARLEP support to groups</i> .....	44
5.15.3	<i>Awareness and sensitization on CARLEP</i> .....	44
5.15.4	<i>Pro poor and vulnerable household</i> .....	44
5.15.5	<i>Gender</i> .....	45
5.15.6	<i>Monitoring and Evaluation</i> .....	45
5.15.7	<i>Pricing of products</i> .....	45
5.15.8	<i>Peak season surplus produce</i> .....	45
5.15.9	<i>Problem of ever rising Feed prices</i> .....	45
5.15.10	<i>Time duration to conduct Annual Outcome Survey</i> .....	45



**LIST OF TABLES**

Table 1. List of indicators for impact monitoring of CARLEP .....	4
Table 2. Households covered by the survey.....	5
Table 3. List of Key Informants for interviews (Treatment Group).....	6
Table 4. Household survey teams.....	14
Table 5. Household composition, age and gender .....	15
Table 6. Age of the respondents .....	15
Table 7. Education level of the household (respondents) .....	15
Table 8. Average Annual household income for 2020 from different income sources.....	16
Table 9. Average Annual household Expenditure for 2020.....	17
Table 10. Dzongkhag (gewog) wise Annual household Income levels .....	17
Table 11. Dzongkhag (gewog) wise Annual household Expenditure levels .....	18
Table 12. Loans availed for agricultural purposes .....	18
Table 13. Purposes of availing loans.....	19
Table 14. Food self-sufficiency status of households in the project area .....	19
Table 15. Food shortage months as reported by Households .....	20
Table 16. Land use pattern (in acres).....	20
Table 17. Use of Irrigation systems for crop production.....	21
Table 18. Area under Irrigation system compared to 2018 or 2019 .....	21
Table 19. Reasons for decline in rice production.....	21
Table 20. Area under vegetables Production .....	22
Table 21. Production of Vegetables .....	22
Table 22. Cattle ownership by HHs .....	23
Table 23. Milk Production.....	24
Table 24. Agriculture production Technologies adopted by HHs .....	25
Table 25. Livestock production technologies adopted by HHs.....	25
Table 26. Area and production of improved fodder.....	26
Table 27. Types of Cattle shed .....	26
Table 28. Use of Farm inputs (agriculture and livestock) by HHs .....	27
Table 29. Training on Farm records keeping and maintenance of records .....	27
Table 30. Reasons for not keeping farm records.....	28
Table 31. Marketing of Vegetables.....	28
Table 32. Top three Markets for vegetables .....	29
Table 33. Sales of Dairy Products.....	29
Table 34. Top three Markets for Dairy Products .....	29
Table 35. Marketing Agents .....	29
Table 36. Marketing Agents .....	30
Table 37. Distance to nearest markets from the HHs .....	30
Table 38. Markets for Agriculture Produce .....	31
Table 39. Markets for Livestock produce.....	31
Table 40. Households owning Biogas and its use per day .....	32
Table 41. Trend in use of other source of energy after bio-gas installation.....	33
Table 42. Cooking Energy sources before biogas .....	33
Table 43. Ratings of the efficiency of biogas compared to LPG and firewood use.....	34
Table 44. Technical problems faced in using biogas .....	34
Table 45. Types of Technical problems faced in using biogas.....	34
Table 46. Asset ownership by households - women participation.....	35
Table 47. Operation of farm Machinery and Equipment .....	35
Table 48. Decision making at the Household level - women participation.....	36
Table 49. HH reporting involvement in Project activities in the year 2020.....	36
Table 50. Involvement of HHs in Project activities.....	37
Table 51. Satisfaction on Project activities by households .....	37
Table 52. Involvement in any other project(s) activities in 2020.....	38

Table 53. a) List of Major problem ONE faced by HHs .....	38
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### **Annexures**

Annexure 1:	Key Informant Interviews detailed report.....	68
Annexure 2:	Household survey sampling details (Tables).....	79
Annexure 3:	Check Lists and Guidelines for the Key Informant Interviews.....	82
Annexure 4:	Questionnaire for Household Survey (revised) .....	84

**Abbreviation**

ABS	Ability Bhutan Society
AOS	Annual Outcome Survey
ARDC	Agriculture Research and Development Center
AGRO	Bhutan Agro Industries Ltd.
CARLEP	Commercial Agriculture and Resilient Livelihoods Enhancement Programme
FAO	Food and Agriculture Organization
FG	Farmers' Group
FY	Financial Year
HHs	Households
HSS	Higher Secondary School
IFAD	International Fund for Agriculture Development
Kg	Kilogram
KI	Key Informant
KII	Key Informant Interview
KIL	Koufuku International Limited
ltr	Liter
M	Mean
MAGIP	Market Access and Growth Intensification Project
Max	Maximum
Min	Minimum
MPU	Milk Processing Units
N	Total number of units
n	Number of units
NFE	Non-formal Education
Nu.	Ngultrum
OGOP	One Gewog One Product
OPM	Office of the Programme Management
$p$	Significant value of statistical test
RAMCO	Regional Agriculture Marketing and Cooperative Office
RLDC	Regional Livestock Development Center
ToR	Terms of Reference

## EXECUTIVE SUMMARY

As a part of monitoring the performance of the project, the Annual Outcome Survey (AOS) evaluates 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.

The main task and the objective of the assignment were to conduct the annual outcome survey for the year 2020 and submit a report. The household survey was designed to collect both quantitative and qualitative data through household interviews using structured questionnaire and through Key Informant Interviews (KII). The present survey (AOS 2020) is the third annual outcome survey. The household survey was implemented in conjunction with qualitative assessments providing information on 'why' and 'how' some outcomes were or was not achieved. The framework for AOS 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. The AOS for 2020 work has been implemented in close coordination with the CARLEP Project Management.

As per the sampling procedures, a total of 759 households were covered from the 20 treatment gewogs of the Programme Dzongkhags. Sampling size for the control group was 600 households from the 8 gewogs of the Project Dzongkhags. Data from the project areas were collected through structured questionnaire and Key Informant Interviews with emphasis on participatory appraisal involving user groups and key stakeholders.

Once the questionnaire was finalized interface was developed using Google Form and SPSS. Dummy data was entered to test the interface. Once the interface was finalized, surveyors were trained on how to punch data in Google Form. The data was punched into Google Form once paper-based survey was completed by enumerators in the field. The survey data was verified for completeness and entered into the Google Form and then in the SPSS software for compilation and analysis.

### Demographic profile, age, and education

Majority of the respondents from the control and treatment group in the sample were female with 64%, while 52% of the head of the households were male. Out of the total sample of N=1359 respondents, 76% belonged to the age group of 18-56 years. Twenty-four percent of the respondents were above 56 years old. Fifteen percent of the respondents (N=1359) had non-formal education, 9% primary level, followed by 6% middle secondary, 5% higher secondary, 4% monastic school, and 62% were not literate.

### Annual income, expenditure, and loans availed

The monthly average household income is Nu. 14,511 and Nu. 10,995 for the treatment (n=759) and control groups (n=600) respectively. The monthly household income of the treatment group was significantly higher than the control group (at P value of 0.001). There is an increasing trend in household income levels over the last 3 years. The household income significantly increased by 30.92 % from Nu. 8809 in 2018 to Nu. 8844 in 2019; and to Nu. 12,753 in 2020.

The overall monthly household expenditure is Nu. 10,589 (N=1359). The household expenditure for the treatment group (n=759) is Nu. 10,623 and Nu. 10,555 for control group (n=600). There is



no significant difference between the control and treatment groups. The monthly household expenditure increased by 22.1% from Nu. 4352 in 2018 to Nu. 5,587 in 2019. The expenditure further increased by 59% from Nu. 4352 in 2018 to Nu. 10,589 in the year 2020. In 2020, the main expenditure incurred by households was on purchase of food items, expenses on health, and children education.

Pemagatshel and Trashiyangtse have the highest household income levels, followed by Mongar, Lhuentse, and Trashigang. On an average, the treatment group annual household income stands at Nu. 180,555.00; as compared to the income levels of Nu. 137,320 of the control group gewogs. On an average the annual household expenditure level for the treatment group stands at Nu. 128,861; while the expenditure for the control group is Nu. 127,098.

**Loan** – In the year 2019, approximately 11% of the total respondents availed loan purely for agricultural purposes. Overall, 11% of the households in the region availed loans in the year 2020. In the treatment group (n=759) 12% of the households availed loan, whereas 9% of the households in control group (n=600) availed loan. The average amount of the loan availed by a household for treatment group (n=759) is Nu. 26,510.79 and for control group (n=600) is Nu. 23,133. The range of loans availed by a household in the treatment group is Nu. 4000 to 66000, and in the control group the range is from Nu. 3000 to 42000. The loans were availed mainly for purchase of farm machinery, purchase of inputs, crop production, and purchase of improved cattle that is the same percentage of households in 2019 and 2020.

#### Food self-sufficiency status

Eighty-five percent of the households (n=759) in the treatment group reported food self-sufficiency, while 69% of the households in control group (n=600) were food self-sufficient. One hundred and fifty-nine households reported improvements in the food security over the year last few years. The self-sufficiency level slightly decreased to 93.7% in 2019 from 94% in 2018. There was a further decrease in self-sufficiency level to 85% in 2020. Most of the gewogs reported food shortages from January to March in the treatment group. The food shortage months in the control group are from January to March and October to November.

#### Land Use and irrigation

The land use in the project areas is predominantly dryland (84%) followed by wetland with 16%. Fallow dryland constitutes 33% of the total dry land area. The average dryland land holding size of a household is 2.39 acres and wet land average holding is 0.46 acres. The overall average land holding size per household is 1.42 acres. Average dryland holding size in control group (n=600) is 2.78 acres and treatment group (n=759) is 2.39 acres. The total dry land under control group is slightly higher than the treatment group, whereas the total wetland is higher in treatment group.

In 2020, 29% of the households from the treatment group (n=759) and 26% of households from the control group (n=600) used irrigation system for crop production. About 19% of the treatment group households cultivate vegetable after rice harvest, where as 23% of the households from control group grow vegetables after rice in 2020. Compared to 2018 and 2019, the number of households using irrigation system in the treatment group in 2020 has decreased from 36% in 2018 and 38% in 2019 to 29% in 2020.

In terms of trend in area under irrigation and crop productivity, majority of the respondents (74% from the treatment group and 80% from the control group) stated that the situation has remained the same over the years. About 20% of the treatment group households and 15% of the control group households reported increase in area under irrigation. On crop productivity trend, 34% from treatment group and 43% from the control reported a decrease in crop productivity.

### Crop & Livestock Production

In the project gewogs, all 759 households from the treatment sample group cultivated vegetables in 2020 in an area of 381 acres. The Control group re-presented by 600 households grew vegetables in 284 acres during the same period. The vegetable cultivated area per household on an average is 0.49 acres in the treatment group, while the area on vegetables per household is 0.44 acres in the control group. In 2018, the percent of HHs engaged in vegetable cultivation was 98% in treatment group, as compared to 94% in control group. In 2019 the same percentage (98%) of HHs were engaged in vegetable cultivation in the treatment group as compared to 92% in the control group.

The survey covered 14 types of vegetables promoted by the Project. The annual production of vegetables in the year 2020 ranged from 5,485 kgs of tomatoes to 187,246 kgs of chillis in the treatment group; while the annual production in control group ranged from 3,016 kgs of tomatoes to 58,596 kgs of chillis. Chillis, cabbages, radish, cauliflower topped the list of the vegetables in terms of quantity and sold. Bulks of the vegetables produced were sold. In the treatment group the percentage of produce sold ranged from 44 to 87, while in the control group percentage sold ranged from 27 to 85.

Thirty-one percent of the households listed wild animal damages to rice, 24% of the households mentioned irrigation water shortages, followed by 17.5% labour shortages and landslide, and 10% of the households cited insect damages. Main reasons stated by the households for both the treatment and control group include wild animal damages, irrigation water shortages, and labour shortages.

### Cattle ownership and Milk production

87% of the HHs from the treatment group and 82% of the HHs from the control group own cattle. The average number of cattle per HH in both the treatment and control group is 3. Out of the total cattle population of 4092, 47% are improved breeds.

In 2018, 85 % of the HHs in treatment group (n=200) own cattle as compared to 53% in control group (N=200). In 2019, 85 % of the HHs in treatment group (n=200) own cattle as compared to 72% in the control group (n=200). In 2020, 87% of the HHs in treatment group (n=759) and 82% of the HHs in control group (n=600) owned cattle. The number of households owning cattle increased from 85% in 2018 to 87% in 2020 in treatment group; while the number of HHs owning cattle in control group increased from 53% in 2018 to 82% in 2020.

All households owning cattle produce milk that is 87% from the treatment group (n=759); and 82% from the control group (n= 600). In summer months the total milk produced is 3168 liters in the treatment group as compared to 2377 liters in control group. During the winter months the milk production is reduced to 2353 liters in treatment group and 1851 liters in the control group. The milk yield per household per day is 4 liters in summer and 3 liters in winter months.

In 2018, in the treatment group, 1850 liters of milk was produced in summer and 1099 liters in winter; while for control group, it was 863 liters in summer and 552 liters in winter. In 2019, in the treatment group, 1517 liters of milk was produced in summer and 735 liters in winter; while for the control group, it was 914 liters in summer and 478 liters in winter. In 2020 the overall milk production has increased compared production in 2018 and 2018.

### **Introduction of new technologies.**

All households (100%) from the treatment group (n=759) adopted improved technologies promoted by the project. Some of the households adopted more than one technology. Within the treatment group 16-30% of the households adopted sprinkle irrigation, improved vegetable cultivation methods, and green house poly tunnels. In the control group (n=600), 559 households (93%) adopted crop production technologies. Within the control group 15-42% of the households adopted sprinkle irrigation, improved vegetable cultivation methods, and green house/poly tunnels.

In 2018, approximately, 72% of HHs in treatment group (n=200) adopted new technologies in dairy development as compared to 30% of HHs in control group. In 2019, approximately 66% of HHs in the treatment group adopted at least one new technology in dairy development as compared to 70% in the control group.

Among both the treatment groups in livestock production, improved fodder production, winter fodder, and improved cattle sheds were the improved technologies adopted by higher percentage of farmers. In the treatment sample group 752 households (99%) adopted new technologies where as 356 households (60%) in the control treatment group adopted new technologies. In the treatment group, the area covered under improved fodder grass was 107 acres and the area under winter fodder was 71 acres. A total of 93 MT of silage was produced during the year. In the control group the area under improved fodder grass and winter fodder was 86 acres and 67 acres respectively; and a total of 69 MT of silage was produced.

Majority of the households (36%) from the treatment and control groups reported having concrete floor, CGI roofing with manger and trough. Mud floor with *single* roofing (29%) is the next type of popular housing for cattle. One hundred and sixty-four households (12%) reported not having any improved cattle shed.

A range of farm inputs in agriculture and livestock production have been used by the households. The use of farm inputs is higher in the treatment group compared to the control group in terms of quantity used and the cost of the inputs

Eighty-eight percent of the HHs from the treatment group (n=759) and 96% from the control group (n=600) did not keep farm records. The percentage of farmers keeping farm records has not increased over the last 3 years. In 2018, approximately, 83% of HHs did not keep written records on expenses in inputs, farm production and income earned from sales of farm produce in the market.; while in 2019 approximately, 89.6% of HHs (N=394) did not keep written records on farm production and income earned from the sale of farm produce. The main reasons for not keeping farm records stated in both the control and treatment groups are: low literacy rates (44%), not aware on benefits of keeping farm records (29%), no knowledge on book keeping (18%), and time consuming (8%).

## Marketing of crop and livestock produce

A total of 551 households (72.6%) from the treatment group and 366 households (61%) from the control groups sold vegetables in the year 2020. One hundred forty-eight households (19.5%) reported selling vegetables in “Groups” in the treatment group, while 93 households (15.5%) from the control group reported selling vegetables in “Groups”. In 2018, 33% of HHs ranked Local Market as number one marketing point for the vegetable growing farmers, followed by Schools and Institutions linkage (32%). Local market was ranked number one with 50% of HHs (N=121) selling dairy products in locality, followed by Trader (16%) and Schools and institutions (16%). In 2019, local market within short vicinity continued to be ranked as the topmost among the markets for selling the vegetables, followed by schools and institutions.

Schools and institutions, nearby local markets, and nearby town/Thromde were the top 3 markets. The households from the treatment group ranked Schools and Institutions as the top ranked market. A total of 409 households (54%) from the treatment group and 251 households (42%) from the control groups sold dairy products in the year 2020. One hundred and four households (14%) reported selling dairy products in “Groups” from the treatment group, while 18 households from the control group (3%) reported selling dairy products in “Groups”. Three hundred and five households (40%) from the treatment group and 233 households (39%) from the control group marketed dairy products individually.

Nearby local markets, nearest town market, and schools and institutions were the 3 top ranked markets for dairy products under the treatment group. For the Control group the top 3 markets were nearby local markets, schools and institutions, and middle men were the top 3 markets.

Seventy-three percent of households (72.6%) from the treatment group and 61% from the control groups sold vegetables in the year 2020. One hundred forty-eight households (19.5%) reported selling vegetables in “Groups” in the treatment group, while 93 households (15.5%) from the control group reported selling vegetables in “Groups. This implies that individually households organize their own markets.

Three hundred thirty-three households (56%) from the treatment and control groups combined reported that they do self-marketing. Twenty-four percent of households stated the middle-men as marketing agent and 20% of households mentioned extension as marketing agents. The Extension Agent and Middleman have not improved the access to markets. In the treatment group, the average distance to the nearest market is 9.46 kms with a range of 1.8 to 29 kms, while the average distance within the control group households is 10.16 kms with a range of 2.3 to 26.0 kms.

## Trend analysis of major parameters of annual outcome survey

1. **Gender** - In 2018, 48% of the respondents (N=192) were male while 52% (N=208) were female. In 2019, 51.5% of the respondents (n=206) were male while 48.5% (n=194) were female. In 2020, 64% were female, while 52% of the head of the households were male.
2. **Education** – In 2018, approximately 60% of respondents never went to school in control group compared to 42% treatment group. In 2019, approximately 55% of the respondents were illiterate, while in 2020; 62% of the respondents were illiterate.
3. In 2018; 27% of respondents from treatment group had formal education (Primary, Middle Secondary, Higher Secondary and University graduate) while control group has 18%. In 2019, approximately 15% (n=32) of the women had formal education (primary, middle, higher

secondary and university) as compared to 32% (n=67) in men; In 2020, 15% of the respondents (N=1359) had non-formal education, 9% primary level, followed by 6% middle secondary, 5% higher secondary, and 4% monastic school, and 62% of the respondents were illiterate.

4. **Age** -The age ranged between 16 and 82 years in 2018 and 2019. In 2020 76% (N=1359) belonged to the age group of 18-56 years and 24% of the respondents were above 56 years.
5. **Income** - In the year 2018, the average monthly income of the HHs in the region was Nu..8809 (N=399, Max=75375, Min=125). Average monthly income of the HHs in the region in 2019 was Nu..8844 (N=400, Max=79333, Min=0), with a marginal increase by 0.4% as compared to 2017. In 2020 the monthly average household income was Nu. 14,511 and Nu. 10,995 for the treatment (n=759) and control groups (n=600) respectively. The monthly household income of the treatment group was significantly higher than the control group (at P value of 0.001). There is an increasing trend in income levels over the last 3 years. The household income significantly increased by 30.92 % from Nu. 8809 in 2018 to Nu. 8844 in 2019; and to Nu. 12,753 in 2020.
6. **Expenditure** - Average monthly HHs expenditure was Nu..4352 (N=400) in 2018, and Nu. 5,587 in 2019. In 2020, The overall monthly household expenditure is Nu. 10,589 (N=1359). The household expenditure for the treatment group (n=759) is Nu. 10,623 and Nu. 10,555 for control group (n=600). There is no significant difference between the control and treatment groups. The monthly household expenditure increased by 22.1% from Nu. 4352 in 2018 to Nu. 5,587 in 2019. The expenditure further increased by 59% from Nu. 4352 in 2018 to Nu. 10,589 in the year 2020. In 2020, the main expenditure incurred by households is on purchase of food items, expenses on health, and children education.
7. **Loan** – In the year 2019, approximately 11% of the total respondents availed loan purely for agricultural purposes. Overall, 11% of the households in the region availed loans in the year 2020. In the treatment group (n=759) 12% of the households availed loan, whereas 9% of the households in control group (n=600) availed loan. The average amount of the loan availed by a household for treatment group (n=759) is 26,510.79 and for control group (n=600) is Nu. 23,133. The range of loans availed by a household in the treatment group is Nu. 4000 to 66000, and in the control group the range is from Nu. 3000 to 42000. The loans were availed mainly for purchase of farm machinery, purchase of inputs, crop production, and purchase of improved cattle that is the same percentage of households in 2019 and 2020.
8. **Food self-sufficiency** – In 2018, 94% of the HHs (n=399) in the region were food secure. The proportion of HHs facing food shortages was higher in control group (7%, n=200) as compared to treatment group (5.5%, n=200). In the year 2019, the food self-sufficiency level slightly decreased to 93.7%. The percentage of HHs facing food shortages was higher in the control group (6%) compared to the treatment group (5.5%). In 2020, 85% of the households (n=759) in the treatment group reported food self-sufficiency, while 69% of the households in control group (n=600) reported food self-sufficiency. One hundred and fifty-nine households reported improvements in the food security over the year last few years. The self-sufficiency level slightly decreased to 93.7% in 2019 and there was a further decline in self-sufficiency level to 85% in 2020. Most of the gewogs reported food shortages from January to March in the treatment group. The food shortage months in the control group are from January to March and October to November.
9. **Land use** – The average land holding was 3.3 acres per HH in 2018. Approximately, 45% of the HHs had land registered under woman. The region was dominated by dryland agriculture characterized by 2.7 acres of dryland and only 0.3 acres of wetland per HHs on average. Approximately less than 50% of land was left fallow in 2018. The 2020 land use in the project



areas is predominantly dryland (84%) followed by wetland with 16%. Fallow dryland constitutes 33% of the total dry land area. The average dryland land holding size of a household is 2.39 acres and wet land average holding is 0.46 acres. The overall average land holding size per household is 1.42 acres. Average dry land holding size in control group (n=600) is 2.78 acres and treatment group (n=759) is 2.39 acres. The total dry land under control group is slightly higher than the treatment group, whereas the total wetland is higher in treatment group.

10. **Irrigation use-** In 2018, approximately 36% of HHs in treatment group used irrigation system as compared to 16% in control group. 31% of HH in treatment and 29% of HHs in control group reported increased in area under irrigation as compared to previous year. In 2019, approximately 38% of HHs in the treatment group used irrigation system as compared to 17% in the control group. As compared to 2017, the area under irrigation has increased by about 14% in the treatment group, while 6% increase in the control group. In 2020, 29% of the households from the treatment group (n=759) and 26% of households from the control group (n=600) used irrigation system for crop production. About 19% of the treatment group households cultivate vegetable after rice harvest, where as 23% of the households from control group grow vegetables after rice. Compared to 2018 and 2019, the number of households using irrigation in the **treatment group** in 2020 has decreased from 36% in 2018 and 38% in 2019 to 29% in 2020. In 2020, a total of 222 sample households from the treatment group (n=759) and 158 households from the control group (n=600) provided the responses on the trend. Majority of the respondents (74% from the treatment group and 80% from the control group) stated that the situation has remained the same over the years. About 20% of the treatment group households and 15% of the control group households reported increase in area under irrigation. On crop productivity trend, 34% from treatment group and 43% from the control reported a decrease in crop productivity.
11. **Vegetable cultivation** – In 2018, the percent of HHs engaged in vegetable cultivation was 98% in treatment group, as compared to 94% in control group. In 2019 the same percentage (98%) of HHs were engaged in vegetable cultivation in the treatment group as compared to 92% in the control group. However, in 2020 all 759 households (100%) from the treatment sample group cultivated vegetables in 2020 in an area of 381 acres. Also 100% of the control group households (n=600) grew vegetables in 284 acres during the same period. In 2018, Treatment group had 0.4 acres per HH allocated for vegetable production as compared to 0.2 acres per HH in control group. In 2019, treatment group had 0.23 acres per HH allocated for vegetable production as compared to 0.21 acres per HH in control group. **In 2020**, the vegetable cultivated area per household on an average is 0.49 acres in the treatment group, while the area on vegetables per household is 0.44 acres in the control group. In 2020 the survey covered 14 types of vegetables promoted by the Project. The annual production of vegetables in the year 2020 ranged from 5,485 kgs of tomatoes to 187,246 kgs of chilis in the treatment group; while the annual production in control group ranged from 3,016 kgs of tomatoes to 58,596 kgs of chilis. Overall, the production of vegetables per household is 615kgs and 351 kgs in the treatment and control groups respectively.
12. **Cattle ownership & milk production** - In 2018, 85 % of the HHs in treatment group (n=200) own cattle as compared to 53% in control group (N=200). In 2019, 85 % of the HHs in treatment group (n=200) own cattle as compared to 72% in the control group (n=200). In 2020, 87% of the HHs in treatment group (n=759) and 82% of the HHs in control group (n=600) owned cattle. The number of households owning cattle increased from 85% in 2018 to 87% in 2020 in treatment group; while the number of HHs owning cattle in control group increased from 53% in 2018 to 82% in 2020.

In 2018, in the treatment group, 1850 liters of milk was produced in summer and 1099 liters in winter; while for control group, it was 863 liters in summer and 552 liters in winter. In 2019, in the treatment group, 1517 liters of milk was produced in summer and 735 liters in winter; while for the control group, it was 914 liters in summer and 478 liters in winter. In 2020 the overall milk production has increased compared production in 2018 and 2019. In 2020, all households owning cattle produce milk that is 87% from the treatment group (n=759); and 82% from the control group (n= 600). In summer months the total milk produced is 3168 liters in the treatment group as compared to 2377 liters in control group. During the winter months the milk production is reduced to 2353 liters in treatment group and 1851 liters in the control group. The milk yield per household per day is 4 liters in summer and 3 liters in winter months.

13. **New technologies** – In 2018, approximately, 72% of HHs in treatment group (N=200) adopted new technologies in dairy development as compared to 30% of HHs in control group. In 2019, approximately 66% of HHs in the treatment group adopted at least one new technology in dairy development as compared to 70% in the control group. In 2020 All households (100%) from the treatment group (N=759) adopted improved technologies promoted by the project. Some of the households adopted more than one technology. Within the treatment group 16-30% of the households adopted sprinkle irrigation, improved vegetable cultivation methods, and green house poly tunnels. In the control group (N=600), 559 households (93%) adopted crop production technologies. Within the control group 15-42% of the households adopted sprinkle irrigation, improved vegetable cultivation methods, and green house/poly tunnels.
14. **Market place** – In 2018, 33% of HHs ranked Local Market as number one marketing point for the vegetable growing farmers, followed by Schools and Institutions linkage (32%). Local market was ranked number one with 50% of HHs (N=121) selling dairy products in locality, followed by Trader (16%) and Schools and institutions (16%). In 2019, local market within short vicinity continued to be ranked as the topmost among the markets for selling the vegetables, followed by schools and institutions. In 2020, schools and institutions, nearby local markets, and nearby town/Thromde were the top 3 markets. The households from the treatment group (n=759) ranked schools and Institutions as the top ranked market in 2020 for vegetables. For dairy products under treatment group (n=759) nearby local markets, nearest town market, and schools and institutions were the 3 top ranked markets.
15. **Vegetable sold** – In 2018, 67% of HHs (N=400) sold vegetables for cash income. In 2019, 61% of the HHs in the treatment group (n=200) and 48% of HHs in the control group (n=200) produced and sold vegetables in the markets. In 2020, the main vegetables produced and sold were Chilis, cabbages, radish, cauliflower at the top of the list. In the treatment group (n=759) the percentage sold ranged from 44 to 87, while in the control group (n=600) the % sold ranged from 27 to 85. Similarly, the sale per household is 439kgs and 196 kgs in the treatment and control groups respectively.
16. **Dairy product sold** – In 2018, 59% of HHs in treatment and 35% in control group sold dairy products such as milk, butter, cheese and curd. In 2019, 54% of HHs in treatment and 50% in the control group sold dairy products. A total of 409 households (54%) from the treatment group and 251 households (42%) from the control groups sold dairy products. One hundred and four households (14%) reported selling dairy products in “Groups” from the treatment group, while 18 households from the control group (3%) reported selling dairy products in “Groups”. Three hundred and five households (40%) from the treatment group and 233 households (39%) from the control group marketed dairy products individually.

**17. Record keeping** – In 2018, approximately, 83% of HHs did not keep written records on expenses in inputs, farm production and income earned from sales of farm produce in the market.; while in 2019 approximately, 89.6% of HHs (N=394) did not keep written records on farm production and income earned from the sale of farm produce. In 2020, 88% of HHs from the treatment group (n=759) and 96% from the control group (n=600) did not keep farm records. The % of farmers keeping farm records has not increased over the last 3 years. The main reasons stated in both the control and treatment groups are: low literacy rates (44%), not aware on benefits of keeping farm records (29%), no knowledge on book keeping (18%), and time consuming (8%).

#### Suggested markets for crop and livestock markets

Based on the feedback of the key informant interviews and the observations during the field visits, the nearest markets for the households of the Project areas are suggested both within and outside of the Project Dzongkhags. Markets within the Dzongkhags mainly include schools, Dratshangs, Gewog Towns, Hydro projects, Bhutan Agro-Industries Limited (BAIL). Outside of the Dzongkhags the markets available are the nearby Dzongkhags, BAIL, OGOP, FCBL Samdrup Jongkhar, Bumthang, and Thimphu.

For livestock produce, the main market is Koufuku International Limited (KIL) in Cheneri Trashigang. The company is not operating in full capacity so they require more milk. They are getting milk supplied from nearby Gewogs of Mongar Dzongkhag. However, the KIL informed that the milk quality is better in Trashigang Dzongkhag.

One Gewog one Product (OGOP) is also one of the potential markets for selected products. OGOP already purchases quinoa, cassava cookies, *kharang*, lemon grass spray and maize cookies from Mongar. And, from Pema Gatshel they purchase cassava flour, and *khamti* rice from Samdrup Jongkhar. While, from Trashigang they purchase kidney beans, roasted peanut and from Trashi Yangtse they purchase *Urka* chilli and *Urka* chilli paste. And, Khololongchu project staffs purchase milk, cheese, butter and agriculture produces in few Gewogs of Trashi Yangtse.

For certain fruits and vegetables, Bhutan Agro-Industry Limited (BAIL) is an established market for the farmers if the price and continued supply can be guaranteed by the farmers.

One hundred and eighty-six households own Biogas, out of which 137 is owned by treatment households. On an average the biogas use is 2.05 hours per day for treatment group and 1.76 hours per day for control group. When asked about the trend in use of other sources of energy after the adoption of biogas, 31% of the households reported decrease in use of other sources of energy, while 60% of the households mentioned that the use of other sources has remained the same. Majority of the sample households from the control and treatment group who use biogas responded that the firewood, electricity, and LPG gas were the main sources of energy before the introduction of gas.

Majority of the biogas owners rated the efficiency of biogas as good to moderate from both the treatment and control groups. Eighty-one percent of the biogas users reported that there are no technical problems on use of biogas. Biogas owners who responded some technical problems on use, stated that lack of skilled operators, poor equipment design, and insufficient dung as the major problems on use of biogas.

## Participation of Women

Among the assets owned by households of both the treatment and control groups, women own land, livestock, cash and savings account, and farm; while, men own farm machinery, vehicles and house. The operation of farm machinery and equipment is mainly done by men. However, women are also involved in operation of farm equipment like mills, dairy equipment, and post-harvest and processing equipment. Majority of the households of treatment and control group responded that women are involved in the entire decision making at the household levels ranging from participation in meetings and trainings to sale of assets and purchases of farm inputs, keeping the household earnings and making investments.

### Household involvement in Project activities

Among the treatment group sample households, 544 households (72%) reported involvement in Project activities in the year 2020. Majority of the households reported involvement in Farmers' training on vegetable production, vegetable production inputs and equipment, farmers' training dairy management, and farmers training agri-business, efficient irrigation system management, and sustainable land management.

A total of 316 households (42%) were very satisfied with the project interventions, 216 households (35%) expressed moderate satisfaction. However 41 households (5%) were not satisfied at all and 18% of the households did not give any response. Four hundred forty-five households (59%) of the treatment households were not involved in any other projects. From the control group 511 households (85%) reported that they were not involved in any other projects.

When asked to list 3 major problems faced by households in crop and livestock production. The number one problems faced are wildlife damages to crops and livestock, seasonal irrigation water shortages, and pest diseases. The second problems rated are wildlife damages, water shortages, and pests and diseases.

### Key Informant Interviews

Interviews were held with Gups, Tshogpas, Agriculture & Livestock Extension Supervisors. The main discussion points included the changes observed as a result of the Project activities. **In addition**, the implementation status of the planned activities for 2020 was discussed and recorded. Some quotes from the Key Informants are:

- *“With the help from CARLEP we got training in agriculture activities and the Project supported with green houses, water tanks, sprinklers, packing and drying machines. Marketing of farm produce is not a problem for us as we sell all our produce to schools.”* (Mongar Vegetable Group).
- *“After project interventions, business and trade has increased in the gewog. Two new shops have opened in the Gewog recently. With the CARLEP project supplying agriculture and livestock inputs, we became more motivated and worked hard to produce more”.* (Khangma Vegetable Group- Sangay Zangmo)

- *“Business has increased in the gewog due to road connectivity and our income levels have increased in the last few years. Marketing is not a problem because we sell all milk we produce to Chenari”*. (20 members Dairy Group from Chaskar)
- *Marketing is not a problem, we send all the milk to Chenari, Trashigang. PMU milk tanker takes all the milk from the milk collection centre. After the establishment of Dairy Group in the gewog, the living standard of farmers has improved’* (Ngatshang Dairy Group - Chairman – Sangay Dorji)

### **Factors contributing to the success of CARLEP activities and sustainability**

The main reasons behind success of CARLEP activities are interest and motivation of the farmers. Other reasons are cultivatable land, no water shortage issues, good road condition to market accessibility, good market and limited alternative source of income such as carpentry, contracts and so forth. However, the challenges for future success are for those Gewogs with not good cultivable land, long distance to the market especially with poor road conditions, water shortages and no other source of income such as carpentry, contract works etc.

It is time to discuss and plan for sustainability of activities initiated by CARLEP as the Project will be completed by 2025. The following suggestions are made to address the sustainability issues: Connecting and collaborating with the market chain actors, Value addition, packaging and post-harvest, Capacity development of entrepreneurs

Continued support to Youth Groups, Continued support and motivation to the respective Gewog Agriculture and Livestock Extension.

### **Challenges and lessons learnt during the field works**

- Due to huge time gap (almost 3 months) in between the first and second survey dates, most of the earlier enumerators were not available to continue for the second survey. The consultancy had to recruit all new enumerators for the second survey except for two. The road conditions were bad in some Gewogs of Mongar Dzongkhag (Silambi, Gongdue) and most Gewogs in Pema Gatshel Dzongkhag (Shumar, Nanong, Zobel, Yurung, Khar and Chongshing). The data collection works could not be completed in one field trip because of travel restrictions due to COVID. Moreover, there was an election planned in Mongar Dzongkhag. Therefore, in the second phase data collection, 18 new enumerators had to be recruited. This incurred additional cost, and time as we had to train new enumerators.

### **Key issues to be addressed by CARLEP**

- Pricing and consistency in quantity of produce to be supplied, Support to individual progressive farmers in addition to group support, Awareness and sensitization on Project activities, focus on activities targeting pro poor and vulnerable households, Gender, and Monitoring and Evaluation.
- Given the scattered project areas, isolated households, and large sampling size, it has been experienced those 45 days is not sufficient to conduct this survey properly. Therefore, longer time duration of at least 75 days is suggested for this survey so that the desired results could be achieved.



## **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 planned to be completed 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 producers' incomes 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' incomes 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 targeted by the project including both project beneficiaries and non-beneficiaries by providing a basis for comparison. 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 2020 has been awarded to Ms Pema Cheizom from Kyingkhor Consultancy Services by the Project.

### **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 differences between the beneficiaries and non-beneficiaries.

The main task is to conduct the annual outcome survey for the year 2020 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 2020 for the Project CARLEP. 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.

#### **1.5 The specific tasks**

- The assignment covers the following key activities:
- Prepare an inception report (or work plan) and submit to OPM
- Study the Project Log frame and identify key indicators for the outcome and impact assessment
- Develop a set of semi-structured or structured questionnaires
- Discuss the indicators and questionnaires with M&EO and review as per the recommendation
- Collaborate with OPM on sampling methods and sample population list, and conduct household sampling
- Pre-test the questionnaires and train all enumerators
- Conduct the Household Survey, Focus Group Discussion and Key Informant Interview
- Analyze the data, and compare it with previous years data
- Write a report and submit to OPM for review
- Present the findings to OPM with recommendation
- Finalized the AOS report as incorporating feedbacks and comments from OPM

## **2 TECHNICAL APPROACH & METHODOLOGY**

The annual survey is expected to provide information on the key performance indicators to enable comparison with the performance in the previous years. In the past, two annual surveys have been completed (2018 and 2019). The present survey for 2020 is the third annual outcome survey. 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 were conducted.

## 2.1 Launching of the Annual Survey 2020

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 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.

The AOS for 2020 was conducted in close coordination with the CARLEP Project Management. The Consulting team is led by Ms. Pema Cheizom with support from other team members (Agriculture Advisor and Data Manager) 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.

## 2.2 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
- Households' 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.

## 2.3 Indicators for monitoring the impact – AOS 2020 and beyond

In the longer term it is expected that the project interventions will improve the living conditions of the beneficiary households. The scenario during each monitoring will map a progressive change in the living conditions of the project households as compared to the baseline data. During such monitoring, the sample population will be visited to make a true comparison with the baseline data. The indicators listed herein were used to monitor at the community and household levels. The list of indicators used during the AOS in 2018 and 2019 based on the IFAD guidelines have been grouped in different categories as given below including addition of few indicators for monitoring the project impact. The following indicators presented in Table 1 will in some way or the other be influenced by the project interventions.

Table 1. List of indicators for impact monitoring of CARLEP

Economic changes	Changes in the income levels Annual incomes and expenditure (trend) Household income from vegetables/dairy/other project interventions Housing conditions (type of housing, access to drinking water & sanitation)
Food security	Agriculture Production levels and trend (annual productivity) Livestock production levels and trend (annual productivity) Food security and self sufficiency
Access to land, irrigation, and agriculture -livestock inputs	Land ownership Access to water irrigation Access to new technologies Access to crop and livestock production inputs (manures & fertilizers, Plant protection chemicals, feeds, )
Access to markets	Farming for subsistence or sale Crops and livestock products sold and cash generated (locally and outside)
Access to Education & health services	Education status (literacy, average years of education by age and gender) Incidence of illness, number of work days lost due to illness, by age and gender Nutritional status of women children
Impact on women	Participation of women in economic activity Status of women in family and community Improvement in general health status of women and children Access to govt. development schemes
Household/Community Participation	Involvement of community in project planning Participation by households in specific Project activities
Project Performance	Degree of satisfaction with the Project

In the standard format for AOS, evidence for changes can be provided by

- (i) Questions that ask respondent households if there has been a change, and if so, the size of the change (large, medium or small).
- (ii) Comparison with a control group can help demonstrate if the change is due to the project (respondents may also be asked if, in their opinion, change can be attributed to the project).

### 3 HOUSEHOLD SURVEY & INTERVIEWS

Annual Impact Monitoring for 2020 was undertaken through the field surveys. A detailed household survey was conducted in the proposed five Dzongkhags covered by CARLEP project. Keeping in line with the Terms of Reference, we propose to have participatory assessment at two different levels.

At the household level, a sample of households to assess and understand the overall outcome of CARLEP project intervention. A semi-structured questionnaire was developed and used to carry out household interviews.

At community level – Key Informant Interviews (KII) with key stakeholders such Gups, Tshogpa, and others were conducted

### 3.1 Sample Size & Sampling Procedure

As per the sampling procedures, a total of 759 households were covered from the treatment gewogs of the Project Dzongkhags. The details on sampling size for the treatment and control groups are given below in Table 2. Sampling size for the control group is 600 households from the 8 gewogs of the Project Dzongkhags.

Table 2. Households covered by the survey

Dzongkhags	Treatment Gewogs			Control Gewogs		
	Gewogs	Nos of HHs		Gewogs	Nos of HHs	
Lhuentse	1	Gangzur	37	1	Jarey	75
	2	Menbi	40			
	3	Tsenkhar	38			
		<i>sub total</i>	115		<i>sub total</i>	<b>75</b>
Mongar	1	Chaskhar	37	1	Gongdue	75
	2	Mongar	40	2	Silambe	75
	3	Ngatshang	37	3	Jurmey	75
	4	Saling	37			
	5	Tsakaling	40			
	6	Chali	38		<i>sub total</i>	225
		<i>sub total</i>	229		<i>sub total</i>	<b>225</b>
Pemagatshel	1	Khar	37	1	Nanong	75
	2	Shumar	37	2	Zobel	75
	3	Yurung	39	3	Chongshing	75
		<i>sub total</i>	113		<i>sub total</i>	<b>225</b>
Trashigang	1	Bidung	38			
	2	Khaling	38			
	3	Radhi	38			
	4	Shongphu	37			
	5	Thrimshing	37			
		<i>sub total</i>	188			
Trashiyangtse	1	Jamkhar	37	1	Yallang	75
	2	Tongshang	37			
	3	Yangste	40			
		<i>sub total</i>	114		<i>sub total</i>	<b>75</b>
<b>5 Dzongkhags</b>		<b>20 gewogs</b>	<b>759</b>		<b>8 gewogs</b>	<b>600</b>

### 3.2 Key Informant Interviews

Key Informant Interviews (KII) were conducted with main stakeholders such Gups, Tshogpa, Agriculture/Livestock officers, Sector Heads from Dzongkhags, and other key stakeholders were conducted, Key informant interviews were preferred over focus group discussions in order to minimize gatherings in view of the COVID situation in the country. A total of 94 KII were conducted with about 31% female interviewees (Table 3). The interviews were based on a checklist of questions and a guideline (Annexure 4.).



Table 3. List of Key Informants for interviews (Treatment Group)

Dzongkhag	Numbers of Key Informants		Total
	Female	Male	
Lhuentse	5	9	14
Trashi Yangtse	9	19	28
Mongar	7	17	24
Pema Gatshel	2	9	11
Trashigang:	6	11	17
Total	29	65	94

### 3.3 Definition of the Study Populations

For this study the population is the:

- ✓ Households of respective selected Gewogs in the selected Dzongkhags
- ✓ Key stakeholders- Gups, Tshogpas and others for KII

The population was sampled independently, but the analyses was carried out jointly (so as to seek their interrelationships) as well as independently. The study covers the geographical area consisting of both the Gewogs with higher sample in Chiwogs with higher population and households.

Having a total sample size of 1359, 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.

### 3.4 Sampling procedure

The sample size is 1359 in total. The selection method for these households has been based on simple random sampling technique wherein, the households from the village were randomly. And, for the Key Informant Interview (KII) the technique used was based on the expert's sampling.

This survey being the third Annual Outcome Survey, a similar survey method applied earlier in the first and the second surveys was adopted. The Key Informant Interviews (KII) were conducted with the main stakeholders of the Project in each Gewog covering a total of 28 Gewogs; that is 8 Gewogs from control group and 20 Gewogs from treatment group. The sampling for KII was purposive and as per the convenience of the stakeholders. The interview informant selection was based on their project knowledge and position in the respective Gewogs.

The summary of the target sample size for each Chiwogs for the study was based on the existing data shared by the project. For samples already identified, the enumerators referred to the sample list that he/she is assigned and the Team Leader planned the number of samples to be covered in a day for each team. The distance covered between the locations of the samples was considered and planned accordingly.

### 3.5 Training of enumerators

Two-day training cum induction course for the enumerators and data entry was organized on 23-24 May 2021 in Thimphu and 3 more days for new enumerators in September 2021. 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
- 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

#### 3.5.1 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 Thimphu. 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 Thimphu in consultation with the CARLEP and from the respective COVID Dzongkhag task force to conduct pre-test on field survey. 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. The pre-test examined the adequacy of the questions; clarity/wording of questions; adequacy of possible responses (pre-coded); sequence/flow of questions; skip patterns; questionnaire administration techniques; and length of time.

The issues encountered during the field practice were discussed in the classroom and any other doubts from the interviewers were clarified. Based on the experience of the field practice, further training and practice was conducted in the areas which require further attention. A session on administrative matters, team formation and field work schedule were discussed which was led by the Team Leader. Standardization of information to be collected is a crucial part especially in following the procedure and filling up the forms. Interviewers were asked to fill in the information

from a general case study and the results were compared. This allowed for checking the inconsistencies in the understanding of the questions.

### 3.5.2 Code of conduct for enumerators of the survey

As a part of the training for the enumerators of the survey, the code of conduct detailed below for data collection during the field survey work was explained to all the enumerators.

#### 1. Honesty & Integrity

The credibility of the outcome of the entire survey rests solely on the accuracy and integrity of data collection exercise. It is critical to record data in a timely and accurate manner. Avoid memorizing and filling the answers later as such entries eventually end up being inaccurate. Never falsify data of any kind as the submission of fabricated records could lead to an immediate dismissal. If you suspect that a respondent is deliberately falsifying his or her responses, keep note of the findings and contact your supervisor for advice.

#### 2. Confidentiality

All information gathered in surveys is highly personal. You have to understand that respondents are only giving out information because they trust you and the organization you work for. Prior to the interview, you are mandated to always guarantee respondents that the information they provide will be kept strictly anonymous and confidential, and will be used for analysis purposes only.

Collected data must never be shared or discussed with anyone who is not your supervisor or a member of the same organization. Data may not be used for any other purpose other than the survey. Enumerators must not discuss the data of specific individuals among themselves, with family, friends, or colleagues.

All data collected and any survey materials, including questionnaires and guides, are the property of the CARLEP and cannot be shared with anybody else apart from the supervisor or the organization you work for.

#### 3. Ethics

Surveys and interviews may not be delegated to any other individual and must be completed by the assigned Enumerator. While on field enumeration an enumerator should display appropriate identification badges/letter of identification. An enumerator shall be liable for higher degree punishment if found irresponsible (Not punctual, manipulating the questionnaire, found under the influence of drugs/alcohol during working hours, and involvement in fights etc)

#### 4. Professionalism

Be mindful of the fact that you are being entrusted with an important task that contributes immeasurably in policy making that leads to our developmental activities as a whole. Be proud of that fact, and take that responsibility seriously.

Face-to face interviews are a way to get information directly from the person being interviewed. It should not be viewed as a mechanical process, but rather as a normal, smooth conversation between two people, and should be conducted in a manner that does not influence or lead the

answers or get external suggestion from other people. The enumerator's personality should be neither over-aggressive nor over-sociable. Should be pleasant, polite and business-like.

### 3.5.3 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. A close monitoring of the data collection process was adopted by the Team Leader, Supervisors, and Coordinators for quality assurance.

The collection of quality data requires proper planning, implementation, and management of the research process. However, the data collection stage is the most crucial stage for better data quality. If proper attention is not paid in this stage, there could be an enormous impact on the quality of data. Therefore, the following measures were taken during the data collection period to ensure gathering of valid and reliable data;

- To maintain uniform survey procedures, guidelines of the survey were distributed to the field staff and core team.
- Field data collection materials and equipment provided to each enumerator
- Data collection schedule/itinerary prepared by the team leader and the other consultants was explained to the survey teams
- Checklists prepared for monitoring quality and progress of field work.
- The Field teams checked whether the questionnaire is filled in completely and correctly before terminating each interview.
- Field Supervisors checked at the end of each day whether the questionnaires are filled in completely and correctly.
- The data thus collected were entered in Google form by the respective enumerator and rechecked by the supervisor.
- The data management team reviewed the data during the data compilation and analysis stage to check whether data are complete and consistent.
- Interviewers required to write their names on the questionnaires. This makes possible to ask for clarification from the interviewer if certain information is not clear.
- Enumerators report to the Supervisors and the Tam leader and the coordinator in an event enumerator face problem in the field
- Enumerators record events that occur differently from the planned activities and report them to the supervisor.

### 3.5.4 Supervision and Monitoring of Fieldwork

One of the essential requirements of data collection is proper supervision of the field work. The data collection teams were closely supervised to cross check the understanding of the of the questionnaires and data recorded thereby in order to improve the confidence of interviewers on the

entire components of the questionnaire. Therefore, monitoring the task of the interviewers started right from the training phase.

The Team Leader with the help of an office assistant monitored the field teams on a regular basis to ensure data quality and bring in uniformity in the data collection process. More emphasis was given during the initial stages of the data collection process to improve the skills and confidence of the enumerators. The team leader maintained constant communication with all the team supervisors during the entire data collection process.

A checklist of points was developed to monitor the team performance. Feedback on the results were given to the field teams immediately so that they can correct themselves on time. Once the completed forms arrive in the office at Thimphu the data management team checked the data to detect any field-based recording errors. Any inconsistency or errors observed was recorded and immediate feedback was given to the field teams. The feedback provided helps improve the data and reminds the enumerators on the importance of maintaining data quality. It also gives them a feel about how field work should be carried out in future.

### **3.5.5 Recruitment of Field Staff**

27 enumerators were recruited to collect data in the selected 5 Dzongkhags in June and in September 2021. It is ensured to select as much graduates as possible followed by class 12 passed students having prior experiences in surveys.

## **3.6 Data Collection- Field Works – Phase I**

In accordance with the requirements for monitoring of project impacts, data from the project areas were collected through structured questionnaire and Key Informant Interviews with emphasis on participatory appraisal involving user groups and key stakeholders. The monitoring plan was based on the implementation plan and the progress of the project works. The first and the second AOS results (2018 and 2019) form the baseline data for monitoring of the socio-economic impact. Information was also gathered from both secondary sources and through the primary survey. The secondary sources include various records, documents, reports or studies related to the project.

### **3.6.1 Household Surveys & Interviews (Lhuentse & Trashigang)**

The first phase of the field survey work was conducted from 01 to 13 June 2021 after obtaining formal approval from the COVID Management task force of the respective Dzongkhags on 30 May 2021. Two separate teams conducted the survey in the two Dzongkhags.

The field survey work was implemented in close coordination with the CARLEP Project Management. The teams of enumerators and supervisors led by Ms. Pema Cheizom conducted the households survey and Key Informant interviews based on the questionnaire and guidelines for KII.

The sampling details of the Gewogs are presented in Table 2 and further details are given in Annexure 2. Also, 28 Key Informant interviews in 6 treatment Gewogs comprising of 9 Female and 19 male was completed.



### 3.6.2 Challenges and lessons learnt

- 1) The Gup, Agriculture and Livestock officers were not informed about the survey in Gangzur Gewog. Then the Project Officer of CARLEP immediately informed them and other Gewogs.
- 2) Farming season. The team experienced difficulty to meet households during office hours because everyone was busy with farming. The team at times went to their farming area and conducted the survey or conducted the survey at night. They obtained help and support from the Agriculture and Livestock Officers of the Gewog.
- 3) Rainy season. The team encountered road blocks while traveling and there were few road widening spots with road closing and opening timings.
- 4) The survey could not be completed in one field trip because of the travel and access restrictions due to COVID from the respective Dzongkhag task force. Therefore, more trips are required to be made. This will incur additional cost and time. Additional time will be required to complete the entire field survey work.
- 5) One team experienced a household of the treatment group had a different house number.
- 6) Few times, the house no. maintained with CARLEP is different to the household no. provided by the selected respondents. Both house no. is reflected in the completed survey form.
- 7) The team experienced respondents are not aware of CARLEP. However, while asking follow up questions, the respondents confirmed to have received support from CARLEP, but weren't specifically aware of the name CARLEP.
- 8) The survey teams experienced most respondents are not aware of their actual land size.

## 3.7 Data Collection: Field Works Phase II

### 3.7.1 Household Surveys and Interviews: Trashigang, Mongar, and Pema Gatshel

The second phase field work began only after 3 months from the completion of the first phase survey. The field work was greatly delayed due to the pandemic and was undertaken from 14 September to 15<sup>th</sup> October 2021 after obtaining approval from the COVID-19 Management task force of the three Dzongkhags Trashigang, Mongar, and Pema Gatshel. One survey team was assigned for each of the 3 Dzongkhags. The teams of enumerators and supervisors led by Ms. Pema Cheizom focused on the data collection on household surveys and the Key Informant interviews. The two Officers from CARLEP, the Monitoring and Evaluation (M & E) Officer and Knowledge Management Officer visited the team in Chaskar and Tsakaling Gewogs of Mongar Dzongkhag. The M & E also visited the team in Shongphu Gewog of Trashigang Dzongkhag.

The household survey in the three Dzongkhags covered 980 households in 14 Gewogs. The sampling details of the Gewogs are presented in Table 2 above and more details are in Annexure 2.

Also, 53 Key Informant interviews in 14 treatment Gewogs and 1 control Gewog comprising of 15 Female and 38 male was completed.

### 3.7.2 Challenges and lessons learnt

- 1) Due to huge time gap in between the first and second survey dates, most of the earlier enumerators were not available to continue for the second survey. This is because some of them went for further studies, and others started business or went to their villages. The consultancy had recruited all new enumerators for the second survey except for two.
- 2) The road conditions were bad in some Gewogs of Mongar Dzongkhag (Silambi, Gongdue) and most Gewogs in Pema Gatshel Dzongkhag (Shumar, Nanong, Zobel, Yurung, Khar and Chongshing).
- 3) The survey coincided with the farming season mainly harvesting season in some Gewogs (Saling, Silambi, Radhi, Mongar and Bidung). In some Gewogs, maize harvesting was in progress (Ngatshang, Shongphu,) and cardamom harvesting and winter chili plantation in (Gongdue). Therefore, it was difficult to meet household members for the survey. The teams, at times visited the farming areas to conduct the survey. In some cases appointments were made for the survey during late evenings and at night. The survey teams sought help and support from the Tshogpas and the Agriculture and Livestock Officers of the Gewogs. In Shongphu, farmers were very much occupied with irrigation pipe laying activity as a part of CARLEP.
- 4) In Bidung, farmers were occupied with village festival. In Jurmey Gewog, the farmers were busy with social obligations (rituals and others), so the team went to the area where they could meet the farmers. This was done in consultation with the village Tshogpas, and with the respective Gewog Agriculture/Livestock Officers.
- 5) In Jurmey Gewog, Tshogpas and Gup were busy with the local government election related works. Villagers were attending cremation rituals and had gone outside the Gewog to Gyelposhing town for Sunday market.
- 6) One team had a vehicle break down (tyre puncture) in Silambi Gewog, and this couldn't be changed or repaired. Given the remoteness of the Gewog, it was difficult to find mechanic and an alternative transport to travel there. The team was held in this Gewog for 4 days, but finally they managed to travel about 3 - 4 hours drive to get the heavy socket equipment to change the tyre
- 7) The data collection works could not be completed in one field trip because of travel restrictions due to COVID. Moreover, there was an election in planned in Mongar Dzongkhag. Therefore, in the second phase data collection, 18 new enumerators had to be recruited. This incurred additional cost, and time as we had to train new enumerators.
- 8) The Gup, Agriculture and Livestock Extension officers were not informed about the survey in Gangzur Gewog. The Project Officer of CARLEP immediately informed them and other Gewogs.
- 9) In Khaling, Radhi, Bidung and Thrimshing Gewogs of Trashigang Dzongkhag some of the household numbers do not match as per the CARLEP list. In Chaskar and Ngatshang Gewogs of Mongar Dzongkhag, some of the household no. is not matching as per CARLEP list. In Khar Gewog, Pema Gatshel Dzongkhag all household house no. is not matching as per CARLEP list. And, in Yurung Gewog one household house no. is not matching.

- 10) While, conducting stakeholder interviews, it was felt that some key stakeholders need to be included. The consultant met Program Director, ARDC, Deputy Chief Executive Officer, Bhutan Agro. Industries, Dzongkhag Agriculture and Livestock Officer, Human Resource and Finance Officer, Koufuku International.
- 11) The Monitoring and Evaluation Officer (M & E), and Knowledge Management Officer of the CARLEP project jointly visited two Gewogs (Chaskar and Tsakaling) to observe and monitor the team. These suggestions from the CARLEP Officials helped, and motivated the team members.
- 12) This helped the consultant to clarify any doubts, and seek clarifications.
- 13) Since the first data collection in May – June 2021, we aim to collect data fast fearing lockdown or any travel restrictions due to COVID-19. Thus, we travelled Gewog to Gewog as quickly as possible throughout both the data collection.
- 14) The survey teams observed most respondents were not aware of their actual land size.

### **3.8 Supervision and quality control of data collection**

A daily check of the completed household survey form was done by the supervisor. The supervisor maintained frequent communication with the KCS Project Officer and the Team Leader. This arrangement has helped to immediately solve any issues in the field. The Team Leader maintained frequent communication with the CARLEP Monitoring and Evaluation Officer with update of the survey status and issues. The Monitoring and Evaluation Officer met the team in Shongphu Gewog, Trashigang and the Knowledge Management Officer visited Chaskar and Tsakaling Gewogs of Mongar Dzongkhag. The Monitoring and Evaluation officer joined the Consultant for a Key Informant interviews with the Deputy CEO of Bhutan Agro Industries and Dzongkhag Livestock Officer of Mongar. The Team also visited the women Dairy Youth group in Traling, Mongar.

### **3.9 Data Management: Compilation, data cleaning, and analysis**

A total of 14 data punchers were recruited for this study. The procedure on data management is described below:

#### Step 1- Interface Development, Testing and Finalization

Once the questionnaire was finalized interface was developed using Google Form and SPSS. Dummy data was entered to test the interface. Once the interface was finalized, surveyors were trained on how to punch data in Google Form. The data was punched into Google Form once paper-based survey was completed by enumerators in the field. The survey data was verified for completeness and entered into the Google Form and then compiled and analyze.

#### Step 2: Data Cleaning

The punching of data in Google Form, and then checking then the data is checked. Furthermore, once the data is migrated further data cleaning shall be initiated with dummy analysis. If there is any logical error in the analysis, the hard copy shall be referred to cross check the original data entry.

On the other hand, the questionnaire format mainly contains by open ended roster questions; hence interface had to be improvised for data grouping to make the final data more meaningful.

### Step 3: Data Analysis

Once the data cleaning is completed, data analysis was initiated. Different statistical data was generated as per the need of the report. The SPSS generated data was further formatted in excel tables and pasted to word file for final reporting. Graphs, charts and other statistical diagrams were developed along with the tabulation. Data analysis was carried in close coordination with the key team members who reviewed the data tables and provide feedback. The reports and tables were generated for plotting of charts and report writing.

### **3.10 Report Preparation**

Based on the data analysis and findings, a comprehensive report has been prepared by the team for submission to the CARLEP Management.

## **4 Work Plan/ Implementation Schedule**

A detailed work plan for the survey work is given on Annexure 3A and Annexure 3B. updates and revisions. The work plan includes the following main components:

- Preparations for the study
- Review of documents and secondary information
- Consultation meetings
- Interviews with the main stakeholders
- Field Surveys
- Data Analysis
- Reporting (Soft and hard copies)

The second phase field survey was delayed by about 12 weeks due to travel restrictions as a result of COVID situation. Accordingly, the timelines have been adjusted.

### **4.1 Field Survey Implementation Plan**

Three teams of enumerators will carry out the field survey data collection (Table 4). Detailed questionnaire and Check lists for group discussions and interviews are given in Annexure 2 and Annexure 3.

Table 4. Household survey teams

Survey Group (nos of members)	Dzongkhags	Treatment Group		Control Group		Key II (# of HHS)
		Gewogs	Nos of HHs	Gewogs	Nos of HHs	
Gr1 - 8 (7 F, 1 M)	Trashigang	5	188	-	-	17
Gr2 -14 (7 F, 7 M)	Mongar-Lhuentse	9	344	4	300	38
Gr3 -14 (6 F, 8 M)	Trashi Yang-Pema Gats	6	227	4	300	39
Total	5 Dzongkhags	20	759	8	600	94

## 4.2 Deliverables and Reporting schedule

The main deliverables/reports are listed below along with submission timings. It is expected that the comments on the reports submitted are received within a week from the date of submission in order to meet the subsequent deadlines.

1. Inception report	End of 1 <sup>st</sup> week from the contract signing
2. First Field Progress Report	June 2021
3. Second Field Progress Report	October 2021
4. First Draft Report	November 2021
5. Submission of the Final Report	November 2021 (after incorporating all comments/suggestions from CARLEP)

## 5 FINDINGS OF THE ANNUAL OUTCOME SURVEY

### 5.1 Demographic Profile - (Literacy rate age and gender)

Majority of the respondents from the control and treatment group in the sample were female with 64%, while 52% of the head of the households were male (Table 5).

Table 5. Household composition, age and gender

	Head of HH (numbers)			Respondents (numbers)		
	Female	Male	Total	Female	Male	Total
Treatment Group	376	383	759	500	259	759
Control group	275	325	600	372	228	600
Total	651	708	1359	872	487	1359
%	48	52	100	64	36	100

Out of the total sample of 1359 respondents, 76% belonged to the age group of 18-56 years. Twenty-four percent of the respondents were above 56 years old (Table 6).

Table 6. Age of the respondents

Age Group	Control Group			Treatment Group			Grand Total	%
	Female	Male	Total	Female	Male	Total		
> 56 years	82	56	138	86	97	183	321	24
18-56 years	290	172	462	412	162	574	1036	76
< 18 years	0	0	0	1	0	1	1	0
Total	372	228	600	500	259	759	1359	199

The literacy level of the respondents by type of education and gender is given on Table 3. Fifteen percent of the respondents (N=1359) had non-formal education, 9% primary level, followed by 6% middle secondary, 5% higher secondary, 4% monastic school, and 62% were not literate (Table 7.)

Table 7. Education level of the household (respondents)

	Education Level	Nos HH (respondents)			
		Female	Male	Total	%
1	Illiterate	576	261	837	62.0



2	Non-Formal Education	151	51	202	15.0
3	Primary Education	52	69	121	9.0
4	Middle Secondary School	51	26	77	6.0
5	Higher Secondary School	30	36	66	5.0
6	Monastic School	10	41	51	4.0
7	Under Graduate	2	3	5	0.0
	Grand Total	872	487	1359	100.0

## 5.2 Household Income and Expenditure

The annual household average income for the treatment and control group from different sources of income is given on Table 8. The monthly average household income was Nu. 14,511 and Nu. 10,995 for the treatment (n=759) and control groups (n=600) respectively. The monthly household income of the treatment group was significantly higher than the control group (at P value of 0.001). There is an increasing trend in income levels over the last 3 years. The household income significantly increased by 30.92 % from Nu. 8809 in 2018 to Nu. 8844 in 2019; and to Nu. 12,753 in 2020.

Table 8. Average Annual household income for 2020 from different income sources

	Income Sources	Average Annual income Nu.		Overall Average (N=1359)
		Treatment Group (N=759)	Control Group (N=600)	
1	Sale of cereals	4,470	1,249	2860
2	Sale of vegetables	15,453	11,414	13434
3	Cash Crop sales	13,286	11,917	12601
4	Livestock (dairy products sold only)	15,799	6,265	11032
5	Livestock (Poultry, goat, piggery etc)	3,031	1,923	2477
6	Fruit crops sold	3,504	3,322	3413
7	NWFP collected and sold	1,438	1,969	1703
8	Salary earned	37,526	29,989	33758
9	Remittances received	11,399	11,754	11576
10	Pension received	2,081	2,687	2384
11	Non-agriculture enterprises	14,728	10,770	12749
12	Off farm activities wages earned	29,215	35,907	32561
13	Processed products sold	4,908	651	2779
14	Other sources (weaving etc)*	17,294	2,122	9708
	Annual average	174,132	131,937	153035
	Monthly average	14,511	10,995	12753

Table 9 presents the annual average household expenditure for 2020 incurred by households for different purposes. The overall monthly household expenditure is Nu. 10,589 (N=1359). The household expenditure for the treatment group (n=759) is Nu. 10,623 and Nu. 10,555 for control group (n=600). There is no significant difference between the control and treatment groups. The monthly household expenditure increased by 22.1% from Nu. 4352 in 2018 to Nu. 5,587 in 2019. The expenditure further increased by 59% from Nu. 4352 in 2018 to Nu. 10,589 in the year 2020. In 2020, the main expenditure incurred by households is on purchase of food items, expenses on health, and children education.

Table 9. Average Annual household Expenditure for 2020

	Average Annual Expenditure (Nu.)	Average Annual Expenditure Nu.		Overall Average (N=1359)
		Treatment (N=759)	Control (N=600)	
1	Purchase of essential food items	38,383	37,434	37908
2	Expenses on fuel for cooking, lighting	3,422	3,656	3539
3	Children schooling expenses	17,752	17,356	17554
4	Purchase of clothes for the family	5,721	5,790	5755
5	Purchase of agricultural inputs	5,299	3,453	4376
6	Purchase of livestock inputs	4,457	4,832	4644
7	Repair and maintenance of house	13,040	16,187	14614
8	Expenditure on hire of labour	8,092	6,110	7101
9	Expenses on health	22,776	22,641	22708
10	Expenses on Rimdo	4,573	4,890	4731
11	Contributions for welfare	3,615	4,214	3914
12	Other expenses (vehicle maint. Transp.etc)	353	103	228
	Annual average	127,481.65	126,662.67	127072
	Monthly average	10,623.00	10,555.00	10589

### 5.3 Household Income and Expenditure (Dzongkhag wise)

The Dzongkhag-wise household income and expenditure is presented in Table 10 and Table 11 below. Pemagatshel and Trashiyangtse have the highest household income levels, followed by Mongar, Lhuentse, and Trashigang. On an average, the treatment group annual household income stands at Nu. 180,555.00; as compared to the income levels of Nu. 137,320 of the control group gewogs

Table 10. Dzongkhag (gewog) wise Annual household Income levels

	Dzongkhag (Gewogs)	Total number of Households	Average annual household income Nu.
	<b>Treatment Group</b>		
1	Lhuntse	115	152,488
2	Mongar	229	174,775
3	Pemagatshel	113	227,544
4	Trashi Yangtse	114	223,528
5	Trashigang	188	124,438
	Treatment Total/Average	759	<b>180,555</b>
	<b>Control Group</b>		
1	Lhuntse	75	96,738
2	Mongar	225	107,186
3	Pemagatshel	225	145,923
4	Trashi Yangtse	75	199,435
	Control Total/Average	600	<b>137,320</b>

The Dzongkhag-wise household expenditure for the treatment and control group is given on Table 11. On an average the annual household expenditure level for the treatment group stands at Nu. 128,861; while the expenditure for the control group is Nu. 127,098.

Table 11. Dzongkhag (gewog) wise Annual household Expenditure levels

	Dzongkhag (Gewogs)	Total number of Households	Average annual household income
	<b>Treatment Group</b>	<b>T:759</b>	<b>Ave:128,861</b>
1	Lhuntse	115	145,418
2	Mongar	229	135,318
3	Pemagatshel	113	123,750
4	Trashi Yangtse	114	135,438
5	Trashigang	188	104,383
	<b>Control Group</b>	<b>T:600</b>	<b>Ave:127,098</b>
1	Lhuntse	75	122,272
2	Mongar	225	117,461
3	Pemagatshel	225	134,994
4	Trashi Yangtse	75	133,666

#### 5.4 Loans availed by Households

The loans availed for agricultural purposes by the sample households is give on Table 12. Overall, 11% of the households in the region availed loans in the year 2020. In the treatment group (n=759) 12% of the households availed loan, whereas 9% of the households in control group (n=600) availed loan. The average amount of the loan availed by a household for treatment group (n=759) is Nu. 26,510.79 and for control group (n=600) is Nu. 23,133. The range of loans availed by a household in the treatment group is Nu. 4000 to 66000, and in the control group the range is from Nu. 3000 to 42000.

Table 12. Loans availed for agricultural purposes

Dzongkhags	Numbers of HHs responding & Percentage				Av Loan per HH Nu.	Range (Loan Amt Nu.)
	Yes	No	Total	% Yes		
<b>Treatment</b>					<b>26510.79</b>	
Lhuntse	19	96	115	15	38356.52	32105 to 57,838
Mongar	33	196	229	30	24126.76	5000 to 66000
Pemagatshel	6	107	113	15	8407.08	4000 to 13000
Trashi Yangtse	21	93	114	15	36371.05	19459 to 64858
Trashigang	12	176	188	25	25292.55	34342 to 58757
<b>Control</b>					<b>23133.46</b>	
Lhuntse	12	63	75	10	42026.67	42000
Mongar	9	216	225	30	8444.44	12000 to 13000
Pemagatshel	24	201	225	30	19529.41	3000 to 41000
Trashi Yangtse	11	64	75	10	22533.33	22533
Grand Total/Av	147	1212	1359	11	<b>24822.00</b>	

The loans availed were mainly for purchase of farm machinery, purchase of inputs, crop production, and purchase of improved cattle (Table 13.). Thirty-one percent of the households availed loans for purchase of farm machinery, 19% households availed loans for cash crop cultivation, followed by 12% for purchase of improved cattle, 7% for purchase of fertilizers, and 6% for vegetables seeds.

Table 13. Purposes of availing loans

	Loan purpose	Control	Treatment	Total	%
1	Purchase Farm Machinery	10	36	46	31
2	Cash crop cultivation	14	14	28	19
3	Purchase improved cattle	10	8	18	12
4	Farm inputs fertilizers	3	8	11	7
5	Vegetables seeds & supplies	3	6	9	6
6	Orchard development	2	5	7	5
7	Green houses	2	4	6	4
8	Construct cattle sheds	2	3	5	3
9	To start poultry	3	3	6	4
10	Purchase milk cans	0	1	1	1
11	Mushroom cultivation	1	0	1	1
12	Other purposes	6	3	9	6
	Total	56	91	147	100

### 5.5 Food self-sufficiency status

Table 14 presents the food self-sufficiency status. Eighty-five percent of the households (n=759) in the treatment group reported food self-sufficiency, while 69% of the households in control group (n=600) reported food self-sufficiency. One hundred and fifty-nine households reported improvements in the food security over the year last few years. The self-sufficiency level slightly decreased from 94% in 2018 to 93.7% in 2019. There was a further decrease in self-sufficiency level to 85% in 2020. One hundred and fifty-nine households (25%) reported improvements in the food security over the years in the treatment group, while **64 households (13%) of the control group reported improvements over the years.**

Table 14. Food self-sufficiency status of households in the project area

Dzongkhags/Gewogs	HHs reporting (Food self-sufficiency)	HHs reporting (Food Shortages)	Nos of months food shortage in a year	HHS reporting Improvements over years
<b>Treatment (N=759)</b>				
Lhuntse	111	2	2	12
Mongar	197	3	4	85
Pemagatshel	74	2	2	16
Trashi Yangtse	86	2	4	9
Trashigang	176	0	0	37
Treatment total/Av	644	9	2	159
%	85	1	0	25
<b>Control (N=600)</b>				
Lhuntse	61	2	3	0
Mongar	163	3	5	19
Pemagatshel	191	1	2	45
Trashi Yangtse	63	2	7	0
Control total/Av	478	8	4	64
%	80	1	1	13

The specific months of food shortages reported by the households from the gewogs is given on Table 15. Most of the gewogs reported food shortages January to March in the treatment group. The food shortage months in the control group are from January to March and October to November.

Table 15. Food shortage months as reported by Households

	Dzongkhag	Gewog	Months of food shortage
Treatment	Mongar	Saling	February, March
		Chali	March
	Lhuntse	Gangzur	January, March
	Pemagatshel	Yurung	January, May
	Trashhi Yangtse	Yangtse	June, July
		Jamkhar	March, April
Control	Mongar	Gongdue	April, May
		Jurmey	February, March, April
	Lhuntse	Jarey	January, February, November
	Trashhi Yangtse	Yallang	January, February, March, October, November
	Pemagatshel	Nanong	October, November

## 5.6 Land Use and irrigation

The land use pattern of the households under the treatment and control groups are presented in Table 16. The land use in the project areas is predominantly dryland (84%) followed by wetland with 16%. Fallow dryland constitutes 33% of the total dry land area. The average dryland land holding size of a household is 2.39 acres and wet land average holding is 0.46 acres. The overall average land holding size per household is 1.42 acres. Average dry land holding size in control group (n=600) is 2.78 acres and treatment group (n=759) is 2.39 acres. The total dry land under control group is slightly higher than the treatment group, where as the total wetland is higher in treatment group.

Table 16. Land use pattern (in acres)

Land Holdings	Control Group (N=600)	Treatment Group (N=759)	Total/Av	%
Dry land under cultivation	1070.63	1062.90	2133.54	67.0
Dry land Fallow	598.70	459.95	1058.65	33.0
Total Dry land owned by HHs	1669.33	1522.86	3192.19	<b>84.0</b>
Average Dry land holding per HH	2.78	2.01	<b>2.39</b>	
Wet land under cultivation	43.343	431.021	474.364	75.8
Wet Land Fallow	26.87	124.134	151.004	24.1
Total Wet land owned by HHs	70.213	555.155	625.368	<b>16.0</b>
Total Land (wetland + dryland)	1739.54	2078.01	<b>3817.55</b>	
Average Wet land holding per HH	0.12	0.73	<b>0.46</b>	
Overall average holding size	1.39	1.37	<b>1.42</b>	

### 5.6.1 Use of irrigation

Table 17 presents the use of irrigation system for crop and livestock production. Twenty nine percent of the households from the treatment group (n=759) and 26% of households from the control group (n=600) use irrigation system for crop production. About 19% of the treatment group households cultivate vegetable after rice harvest, where as 23% of the households from control group grow



vegetables after rice. Compared to 2018 and 2019, the number of households using irrigation in the treatment group in 2020 has decreased from 36% in 2018 and 38% in 2019 to 29% in 2020.

Table 17. Use of Irrigation systems for crop production

Irrigation for crops	Treatment Group (n=759)			Control Group (n=600)		
	Nos of HHs Reporting			Nos of HHs Reporting		
	Yes	No	Total	Yes	No	Total
Use of irrigation channel systems	223	536	759	155	445	600
%	<b>29</b>	71	100	<b>26</b>	74	100
Vegetable cultivation after rice harvest	105	452	557	93	305	398
%	<b>19</b>	81	100	<b>23</b>	<b>77</b>	100

### 5.6.2 Trends in terms of area under irrigation and crop productivity

Table 18 presents trend in area under irrigation and crop productivity. A total of 222 sample households from the treatment group (n=759) and 158 households from the control group (n=600) provided the responses on the trend. Majority of the respondents (74% from the treatment group and 80% from the control group) stated that the situation has remained the same over the years. About 20% of the treatment group households and 15% of the control group households reported increase in area under irrigation. On crop productivity trend, 34% from treatment group and 43% from the control reported a decrease in crop productivity.

Table 18. Area under Irrigation system compared to 2018 or 2019

Trends in terms of area and crop productivity	Treatment Group			Control Group		
	Number of HHs reporting	Irrigated area increased/decreased (ac)	Crop productivity trend (Nos of HHs)	Number of HHs reporting	Actual area increased/decreased (ac)	Crop productivity trend (#s of HHs)
Increased	43	<b>37.57</b>	15	24	14.15	9
Decreased	14	2.18	78	8	1.82	62
Remained same	165 (74%)	0.45	134	126 (80%)	1.54	73
Total	<b>222</b>	40.20	227	<b>158</b>	17.51	144

The main reasons for decline in rice production are given in Table 19 below. 31% Thirty-one percent of the households listed wild animal damages to rice, 24% of the households mentioned irrigation water shortages, followed by 17.5% labour shortages and land slide, and 10% of the households cited insect damages. Main reasons stated by the households for both the treatment and control group include wild animal damages, irrigation water shortages, and labour shortages.

Table 19. Reasons for decline in rice production

Main reasons for decline		No of HHs reporting		Total	%
		Treatment	Control		
1	Wild animal damages	5	4	9	31.0
2	Irrigation water shortages	4	3	7	24.0
3	Labour shortages	2	3	5	17.5

4	Land slide damage fields	1	4	5	17.5
5	Insect damage	2	1	3	10.0
	Total	14	15	29	100.0

## 5.7 Crops and livestock Production

### 5.7.1 Area and Production of Vegetables

Table 20 presents the area under vegetables cultivation. In the project gewogs, all 759 households from the treatment sample group cultivated vegetables in 2020 in an area of 381 acres. The Control group re-presented by 600 households grew vegetables in 284 acres during the same period. The vegetable cultivated area per household on an average is 0.49 acres in the treatment group, while the area on vegetables per household is 0.44 acres in the control group. In 2018, the percent of HHs engaged in vegetable cultivation was 98% in treatment group, as compared to 94% in control group. In 2019 the same percentage (98%) of HHs were engaged in vegetable cultivation in the treatment group as compared to 92% in the control group.

Table 20. Area under vegetables Production

Dzongkhags/Gewogs	Vegetable Area (ac)	Number of HHs cultivating	Area cultivated per HH (ac)
<b>Treatment</b>			
Lhuntse	56	115	0.49
Mongar	156	229	0.68
Pemagatshel	41	113	0.36
Trashi Yangtse	64	114	0.56
Trashigang	64	188	0.34
Treatment Total/Av	381	759	0.49
<b>Control</b>			
Lhuntse	33	75	0.44
Mongar	78	225	0.35
Pemagatshel	150	225	0.67
Trashi Yangtse	23	75	0.30
Control Total/Av	284	600	0.44
Grand Total	949	1959	

Table 21 below presents the list of vegetables grown in 2020 in the treatment and control gewogs showing the quantity produced and sold by the households. The survey covered 14 types of vegetables promoted by the Project. The annual production of vegetables in the year 2020 ranged from 5,485 kgs of tomatoes to 187,246 kgs of chillis in the treatment group; while the annual production in control group ranged from 3,016 kgs of tomatoes to 58,596 kgs of chillis.

Table 21. Production of Vegetables

	Types of Vegetables	Treatment Group			Control Group		
		Prod. in 2020	Qty Sold	%sold	Prod. in 2020	Qty Sold	% sold
1	Chilli (kg)	187,246	163,646	87.4	58,596	49,599	84.6
2	Cabbage (kg)	87,962	68,486	77.9	36,815	17,195	46.7
3	Radish (kg)	60,083	22,149	36.9	50,109	15,060	30.1
4	Cauliflower (kg)	49,368	28,037	56.8	22,563	12,022	53.3

5	Broccoli (kg)	38,506	27,621	71.7	17,589	10,933	62.2
6	Onion (kg)	20,445	9,041	44.2	16,353	9,518	58.2
7	Carrot (kg)	14,525	9,001	62.0	5,182	2,005	38.7
8	Tomato (kg)	5,485	2,527	46.1	3,016	806	26.7
9	Asparagus *	2,857	2,337	81.8	383	219	57.2
10	Others**	71,971	53,947	75.0	24,403	14,758	60.5
	Total/Av	466,476	332,845	62.7	210,606	117,357	50.8
Production & Sale Per household (kgs)		<b>615</b>	<b>439</b>		<b>351</b>	<b>196</b>	

\*\*Others = Potatoes, beans, brinjal, pumpkin, spinach

\*Asparagus = bundle= 1 bundle=1 kg

Chillis, cabbages, radish, cauliflower topped the list of the vegetables produced and sold. Bulks of the vegetables produced were sold. In the treatment group the percentage sold ranged from 44 to 87, while in the control group % sold ranged from 27 to 85. Overall, the production per household is 615kgs and 351 kgs in the treatment and control groups respectively. Similarly the sale per household is 439kgs and 196 kgs in the treatment and control groups respectively.

### 5.7.2 Cattle Ownership

Table 22 presents the cattle ownership by the HHs. 87% of the HHs from the treatment group and 82% of HHs from the control group own cattle. The average number of cattle per HH in both the treatment and control group is 3. Out of the total cattle population of 4092, 47% are improved breeds.

Table 22. Cattle ownership by HHs

Dzongkhag	Improved breed owned by HHs (Nos)	Local breed owned by HHs (nos)	Total Cattle owned by HHs	Average number of cattle per HH	Nos of HHs owning cattle	% HHs owning cattle
Treatment Group						
Lhuentse	206	302	508	4	106	14
Mongar	471	325	796	3	212	28
Pemagatshel	210	25	235	2	92	12
Trashiyangtse	126	138	264	2	91	12
Trashigang	188	355	543	3	157	21
Treatment total	1,201	1,145	2,346	3	658	87
Control Group						
Lhuentse	73	401	474	6	60	10
Mongar	231	438	669	3	177	30
Pemagatshel	368	102	470	2	206	34
Trashiyangtse	48	85	133	2	49	8
Control total/Av	720	1,026	1,746	3	492	82
Grand Total	1,921	2,171	4,092	3	1,150	
%	47	53	100			

In 2018, 85 % of the HHs in treatment group (n=200) own cattle as compared to 53% in control group (N=200). In 2019, 85 % of the HHs in treatment group (n=200) own cattle as compared to

72% in the control group (n=200). In 2020, 87% of the HHs in treatment group (n=759) and 82% of the HHs in control group (n=600) owned cattle. The number of households owning cattle increased from 85% in 2018 to 87% in 2020 in the treatment group; while the number of HHs owning cattle in control group increased from 53% in 2018 to 82% in 2020.

### 5.7.3 Milk Production

All households owning cattle produce milk that is 87% from the treatment group (n=759); and 82% from the control group (n= 600). In summer months the total milk produced is 3168 liters in the treatment group as compared to 2377 liters in control group. During the winter months the milk production is reduced to 2353 liters in treatment group and 1851 liters in the control group. The milk yield per household per day is 4 liters in summer and 3 liters in winter months.

Table 23. Milk Production

Dzongkhag	Nos of HHs producing milk	%	Total Milk Production per day (Litres)		Milk yield per HH per day (Liters)	
			Litres	Winter	Summer	Winter
<b>Treatment Gr (N=759)</b>						
Lhuentse	106	14	598	406	5	4
Mongar	212	28	1146	830	5	4
Pemagatshel	92	12	316	256	3	2
Trashiyangtse	91	12	468	355	4	3
Trashigang	157	21	640	506	3	3
Treatment total/Av	<b>658</b>	<b>87</b>	<b>3168</b>	<b>2,353</b>	<b>4</b>	<b>3</b>
<b>Control (N=600)</b>						
Lhuentse	60	10	457	349	6	5
Mongar	177	30	886	700	4	3
Pemagatshel	206	34	831	661	4	3
Trashiyangtse	49	8	203	141	3	2
Control total/Av	<b>492</b>	<b>82</b>	<b>2377</b>	<b>1851</b>	<b>4</b>	<b>3</b>
Grand Total	1,150	85	5545	4204	4	3

In 2018, in the treatment group, 1850 litters of milk was produced in summer and 1099 litters in winter; while for control group, it was 863 litters in summer and 552 litters in winter. In 2019, in the treatment group, 1517 liters of milk was produced in summer and 735 liters in winter; while for the control group, it was 914 liters in summer and 478 liters in winter. In 2020 the overall milk production has increased compared production in 2018 and 2018.

### 5.7.4 Adoption of Crops & Livestock Production technologies

Multi-choice questions on the types of technologies were asked to the sample households. The number of households reporting types of technologies adopted is given on Table 24. All households (100%) from the treatment group (N=759) adopted improved technologies promoted by the project. Some of the households adopted more than one technology. Within the treatment group 16-30% of the households adopted sprinkle irrigation, improved vegetable cultivation methods, and green house poly tunnels.

In the control group (N=600), 559 households (93%) adopted crop production technologies. Within the control group 15-42% of the households adopted sprinkle irrigation, improved vegetable cultivation methods, and green house/poly tunnels.

In 2018, approximately, 72% of HHs in treatment group (N=200) adopted new technologies in dairy development as compared to 30% of HHs in treatment group. In 2019, approximately 66% of HHs in the treatment group adopted at least one new technology in dairy development as compared to 70% in the control group.

Table 24. Agriculture production Technologies adopted by HHs

	Types of production technologies adopted	Nos of HHs responding			
		Treatment	%	Control	%
1	Sprinkle Irrigation	306	30	235	42
2	Improved Vegetables cultivation techniques	202	20	108	19
3	Green House/Poly-tunnels	156	16	85	15
4	Plant Protection	106	11	14	3
5	Farm mechanization and Land Development	83	8	51	9
6	Post-harvest Technology	64	6	58	10
7	Drip Irrigation	39	4	7	1
8	Soil and Water Management	30	3	0	0
9	Composting (Heap compost or vermicomposting)	18	2	1	0
	Total	1004	100	559	100

The list of livestock technologies adopted by the households of treatment and control group is presented in Table 25. In the treatment sample group (n=759), 752 households (99%) adopted new technologies whereas 356 households (60%) in the control group (n=600) adopted new technologies. Among both the treatment groups improved fodder production, winter fodder, and improved cattle sheds were the improved technologies adopted by higher percentage of farmers.

Table 25. Livestock production technologies adopted by HHs

	Types of technologies adopted	Number of HHs responding	%
Treatment Group (Total=752)	Improved Fodder Grass Plantation	193	26
	Improved cattle shed	158	21
	Winter Fodder cultivation	133	18
	Bio-gas	102	14
	Clean Milk Production	69	9
	Feed Conservation (Silage making)	59	8
	Milk Processing and Packaging	38	5
Control Group (Total=356)	Improved Fodder Grass Plantation,	161	45
	Winter Fodder Cultivation,	76	21
	Improved Cattle Shed	69	19
	Bio-gas	24	7
	Clean Milk Production	10	3
	Feed Conservation (Silage making)	10	3
	Milk Processing and Packaging	6	2



### 5.7.5 Production of improved fodder

The area and production of improved fodder is given on Table 26 below for both the treatment and control group. In the treatment group, the area covered under improved fodder grass was 107 acres and the area under winter fodder was 71 acres. A total of 93 MT of silage was produced during the year. In the control group the area under improved fodder grass and winter fodder was 86 acres and 67 acres respectively; and a total of 69 MT of silage was produced. Overall, the area under improved fodder grass and winter fodder per household is 0.142 acre and 0.101 acre.

Table 26. Area and production of improved fodder

Dzongkhags/Gewogs	Area under improved Fodder Grass (acres)	Area under Winter Fodder (acres)	Qty of silage prepared in 2020 (Kgs)	Qty of commercial Feed purchased (kgs)
<b>Treatment (N=759)</b>				
Lhuntse	14	12	12,160	5,309
Mongar	38	27	16,760	33,182
Pemagatshel	18	14	13,005	2,400
Trashi Yangtse	13	7	10,845	4,900
Trashigang	24	11	40,976	9,871
<b>Treatment Total</b>	<b>107</b>	<b>71</b>	<b>93,746</b>	<b>55,662</b>
<b>Control (N=600)</b>				
Lhuntse	11	11	15,200	2,107
Mongar	32	26	25,560	7,861
Pemagatshel	35	25	27,396	10,357
Trashi Yangtse	8	5	890	3,012
<b>Control Total</b>	<b>86</b>	<b>67</b>	<b>69,046</b>	<b>23,337</b>
<b>Total</b>	<b>193</b>	<b>138</b>	<b>162,792</b>	<b>78,998</b>
Area acre per household & Qty kgs per HH	0.142	0,101	120	58

### 5.7.6 Cattle shed in the Project areas

Table 27 below presents the improved cattle sheds promoted by the project. Majority of the households from the treatment and control groups reported having concrete floor, CGI roofing with trough (36%). Mud floor with single roofing (29%) is the next type of popular housing for cattle. One hundred and sixty-four households (12%) reported not having any improved cattle shed.

Table 27. Types of Cattle shed

	Types of cattle sheds	Nos of HHs responding		Total	%
		Treatment (N=759)	Control (N=600)		
1	Concrete floor and CGI roofing with manger and trough	293	190	483	36
2	Mud floor with <i>single</i> roofing	232	156	388	29
3	Concrete floor; <i>single</i> roofing without manger and trough	51	31	82	6
4	No cattle shed	74	90	164	12
	Total	650	467	1,117	

### 5.7.7 Use of Farm Inputs

Table 28 presents the types, quantity and costs of farm inputs used by the sample households in the year 2020. A range of farm inputs in agriculture and livestock production have been used by the households. The use of farm inputs is higher in the treatment group compared to the control group in terms of quantity used and the cost of the inputs.

Table 28. Use of Farm inputs (agriculture and livestock) by HHs

Inputs used	Unit	Treatment Group (N=759)			Control Group (N=600)		
		Quantity	Total Cost	Nos of HHs using	Quantity	Total Cost	Nos of HHs using
Fertilizers	Kgs	29,977	922,172	503	15,890	896,315	215
Improved seeds	Kgs	11,186	471,825	579	9,668	114,789	459
Improved seedlings	Nos	4,423	88,095	357	7,509	14,151	223
Pesticides	Liters /kgs	1,317	94,800	377	678	19,226	153
Farm tools/equipment	Nos	2,746	4,611,269	338	5,354	425,768	160
Improved cattle breeds	Nos	444	453,009	273	8,155	244,100	143
Improved poultry	Nos	1,696	473,430	270	2,420	112,225	154
Improved pigs	Nos	13	1,900	263	2	4,010	127
Improved Pasture seeds	Kgs	1,453	900	292	1,583	1,620	147
Improved Fodder plants	Nos	45,287	15,400	327	15,503	520	240
Total			7,132,800	3,579		1,832,724	2,021

### 5.7.8 Farm Records Keeping

When asked did you receive any training on farm records keeping? the sample households from the treatment and control gewogs provided the responses as presented in Table 29. Eighty-eight percent of the HHs from the treatment group (n=759) and 96% from the control group (n=600) did not keep farm records. The percentage of farmers keeping farm records has not increased over the last 3 years. In 2018, approximately, 83% of HHs did not keep written records on expenses in inputs, farm production and income earned from sales of farm produce in the market.; while in 2019 approximately, 89.6% of HHs (N=394) did not keep written records on farm production and income earned from the sale of farm produce.

Table 29. Training on Farm records keeping and maintenance of records

	Households responding					
	Treatment Group			Control Group		
	Yes	No	Total	Yes	No	Total
Training received on farm records keeping	127	632	759	62	538	600

	%	17	83	100	10	90	100
Maintaining Farm records on production and income		88	671	759	24	576	600
	%	12	88	100	4	96	100
Total		215	1303	1518	86	1114	1200
	%	14	86	100	7	93	100

Table 30 presents the reasons for not maintaining farm records. The main reasons stated in both the control and treatment groups are: low literacy rates (44%), not aware on benefits of keeping farm records (29%), no knowledge on book keeping (18%), and time consuming (8%).

Table 30. Reasons for not keeping farm records

	Reasons for not keeping farm records	Nos of Households responding			
		Treatment	Control	Total	%
1	Low literacy rate	309	295	604	44
2	Not aware on benefits of record keeping	256	138	394	29
3	No knowledge on Farm Record Keeping	128	115	243	18
4	Time Consuming	64	50	114	8
5	No use of keeping it	2	2	4	0
	<b>Total</b>	<b>759</b>	600	1359	100

## 5.8 Marketing of agriculture & livestock produce

### 5.8.1 Marketing and Markets of Vegetables

A total of 551 households (72.6%) from the treatment group and 366 households (61%) from the control groups sold vegetables in the year 2020 (Table 31). One hundred forty-eight households (19.5%) reported selling vegetables in “Groups” in the treatment group, while 93 households (15.5%) from the control group reported selling vegetables in “Groups”.

Table 31. Marketing of Vegetables

Marketing of Vegetables	Numbers of Farmers responding			
	(Treatment Gr)		(Control Gr)	
	Nos	%	Nos	%
Total number of HHs selling vegetables	551	72.6	366	61
Vegetables marketed in groups	148	19.5	93	15.5
Vegetables marketed individually	403	53.1	273	45.5

Schools and institutions, nearby local markets, and nearby town/Thromde were the top 3 markets (Table 32). The households from the treatment group ranked Schools and Institutions as the top ranked market.

In 2018, 33% of HHs ranked Local Market as number one marketing point for the vegetable growing farmers, followed by Schools and Institutions linkage (32%). Local market was ranked number one with 50% of HHs (N=121) selling dairy products in locality, followed by Trader (16%) and Schools and institutions (16%). In 2019, local market within short vicinity continued to be ranked as the topmost among the markets for selling the vegetables, followed by schools and institutions.

Table 32. Top three Markets for vegetables

	Top three market places ranked by HHs		
	Ranked 1	Ranked 2	Ranked 3
Treatment Group	School and Institutions	Local market within short vicinity	Town/Thromde Market within the region
Control Group	Local market within short vicinity	School and institutions	Town/Thromde Market within the region

### 5.8.2 Marketing and Markets of Dairy Products

A total of 409 households (54%) from the treatment group and 251 households (42%) from the control groups sold dairy products in the year 2020 (Table 33). One hundred and four households (14%) reported selling dairy products in “Groups” from the treatment group, while 18 households from the control group (3%) reported selling dairy products in “Groups”. Three hundred and five households (40%) from the treatment group and 233 households (39%) from the control group marketed dairy products individually.

Table 33. Sales of Dairy Products

	Sale of dairy products	Nos of Households responding			
		Treatment Group N-759	%	Control Group N-600	%
1	Total number of HHs selling dairy products	409	54	251	42
2	Dairy products marketed in groups	104	14	18	3
3	Dairy products marketed individually	305	40	233	39

Nearby local markets, nearest town market, and schools and institutions were the 3 top ranked markets for dairy products under the treatment group (Table 34). For the Control group the top 3 markets were nearby local markets, schools and institutions, and middle men were the top 3 markets.

Table 34. Top three Markets for Dairy Products

	Top three market places ranked by HHs for Dairy Products		
	Ranked 1	Ranked 2	Ranked 3
Treatment Group	Local Market within short vicinity	Town/Thromde Market within the region	Schools and institutions
Control Group	Local Market within short vicinity	Schools and institutions	Middle man or regular contract buyer

Majority of the households (571 from the treatment group – 75%) and 510 households from the control group (85%) responded that there are no traders or persons buying in bulk (Table 35). This implies that individually households organize their own markets.

Table 35. Marketing Agents

Trader or a Person buying in bulk			
	HHS responding Yes	HHS responding No	Total
Treatment Gr	188	571	759
Control Gr	90	510	600

Total	278	1081	1359
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Three hundred thirty-three households (56%) from the treatment and control groups combined reported that they do self marketing (Table 36.). Twenty-four percent of households stated the middle-men as marketing agent and 20% of households mentioned extension as marketing agents. The Extension Agent and Middleman have not improved the access to markets.

Table 36. Marketing Agents

	Has Marketing Agents arrangement improved access to market?			
	Nos of HHs responding			
	Extension Agent	Middle man	Self Marketing (You)	Total
Treatment	61	117	166	344
Control	54	27	167	248
Total	115	144	333	592

Table 37 below presents the distances to the nearest markets from the locations of households. In the treatment group, the average distance to the nearest market is 9.46 kms with a range of 1.8 to 29 kms, while the average distance within the control group households is 10.16 kms with a range of 2.3 to 26.0 kms.

Table 37. Distance to nearest markets from the HHs

Dzongkhags (Gewogs)	Distance from the HHs to nearest market (Kms)	Range (kms)
<b>Treatment Gr</b>		
Lhuntse	5.39	5.2 to 6.3
Mongar	15.42	4.4 to 29.02
Pemagatshel	5.46	1.8 to 7.44
Trashhi Yangtse	7.86	7.4 to 8.6
Trashigang	6.99	3.8 to 11.05
Treatment Gr average	9.46	
<b>Control Gr.</b>		
Lhuntse (one gewog)	3.29	
Mongar	8.21	4 to 17
Pemagatshel	12.82	2.3 to 26
Trashhi Yangtse	13.66	9.5 to 13.5
Control Gr average	10.16	
<b>Overall average</b>	<b>9.78</b>	

## 5.9 Some suggestions for marketing of agriculture & livestock produce

The nearest markets for the households of the Project areas

Table 38. Markets for Agriculture Produce

Project Dzongkhags	Within the Dzongkhag	Outside the Dzongkhag for surplus produce
Trashi Yangtse	<ul style="list-style-type: none"> <li>- Schools,</li> <li>- Dratshang...),</li> <li>- Doksum,</li> <li>- Yangtse town,</li> <li>- Kholongchu Hydro Project</li> </ul>	<ul style="list-style-type: none"> <li>- If more produces then to Bumthang/Thimphu.</li> <li>- Cash crop to Samdrup Jongkhar FCBL.</li> <li>- Bhutan Agro. Industries Limited and OGOP.</li> </ul>
Lhuentse	<ul style="list-style-type: none"> <li>- Schools,</li> <li>- Dratshang</li> <li>- Tshenkar,</li> <li>- Lhuentse town</li> </ul>	<ul style="list-style-type: none"> <li>- Mongar, Bumthang/Thimphu.</li> <li>- If cash crop to Samdrup Jongkhar FCBL.</li> <li>- Bhutan Agro. Industries Limited and OGOP.</li> </ul>
Pema Gatshel	<ul style="list-style-type: none"> <li>- School, dratshang...),</li> <li>- Pema Gatshel town,</li> <li>- Narphung</li> </ul>	<ul style="list-style-type: none"> <li>- Narphung and Samdrup Jongkhar town.</li> <li>- Cash crops send to Samdrup Jongkhar FCBL.</li> <li>- Bhutan Agro. Industries Limited and OGOP.</li> </ul>
Trashigang	<ul style="list-style-type: none"> <li>- School,</li> <li>- Dratshang...),</li> <li>- Trashigang town,</li> <li>- Wamrong.</li> </ul>	<ul style="list-style-type: none"> <li>- Wamrong, Bumthang/Thimphu.</li> <li>- Cash crops send to Samdrup Jongkhar FCBL.</li> <li>- Bhutan Agro. Industries Limited and OGOP.</li> </ul>
Mongar	<ul style="list-style-type: none"> <li>- School,</li> <li>- Dratshang...),</li> <li>- Bhutan Agro. Industries Limited,</li> <li>- Towns - Mongar, Lingmithang &amp; Gyelposhing.</li> </ul>	<ul style="list-style-type: none"> <li>- Nganglam, Bumthang, Thimphu.</li> <li>- Cash crops send to Samdrup Jongkhar FCBL.</li> </ul>

Table 39. Markets for Livestock produce

Dzongkhag	Within the Dzongkhag	Outside the Dzongkhag for surplus produce
Trashi Yangtse	<ul style="list-style-type: none"> <li>- Schools</li> <li>- Dratshangs &amp; other Institutions</li> <li>- Towns (Gewog towns, Doksum town, Yangtse town)</li> <li>- Kholongchu Hydro Project.</li> </ul>	-
Lhuentse	<ul style="list-style-type: none"> <li>- Schools &amp; other Institutions</li> <li>- Dratshangs</li> <li>- Lhuentse town</li> <li>- Gewog, Tshenkar town</li> </ul>	- If there are excess produces they take it to Lingmethang and Mongar town
Pema Gatshel	<ul style="list-style-type: none"> <li>- Institutions (school, dratshang...),</li> </ul>	-



	<ul style="list-style-type: none"> <li>- Towns (Gewog, Pema Gatshel town).</li> </ul>	
Trashigang	<ul style="list-style-type: none"> <li>- Institutions (school, dratshang...),</li> <li>- towns (gewog towns - Trashigang, Wamrong, Rangjung),</li> <li>- Koufuku Company, Chenery.</li> </ul>	<ul style="list-style-type: none"> <li>- If more produces such as fermented cheese than to Indian market.</li> <li>- Koufuku yoghurt, cottage and processed cheese are supplied to Thimphu.</li> <li>- Lingmethang and Bhutan Agro. Limited.</li> </ul>
Mongar	<ul style="list-style-type: none"> <li>- Institutions (school, dratshang...)</li> <li>- Towns (gewogs towns, Mongar, Lingmethang, and Gyelposhing)</li> </ul>	<ul style="list-style-type: none"> <li>- For surplus produce - send to Koufuku Company, Chenery Trashigang.</li> <li>- OGOP (quinoa)</li> <li>- Nganglam town.</li> <li>- Some Gewogs could send to Bumthang and Thimphu.</li> </ul>

For livestock produce, the main market is Koufuku Company in Chenery. The company is not operating in full capacity so they require more milk. They are getting milk supplied from nearby Gewogs of Mongar Dzongkhags too. However, they share milk quality is better in gewogs of Trashigang Dzongkhag.

OGOP is also one of the potential markets for selected products. OGOP already purchases quinoa, cassava cookies, kharang, lemon grass spray and maize cookies from Mongar. And, from Pema Gatshel they purchase cassava flour, and khamti rice from Samdrup Jongkhar. While, from Trashigang they purchase kidney beans, roasted peanut and from Trashi Yangtse they purchase Urka chilli and Urka chilli paste. And, Khololongchu project staffs purchase milk, cheese, butter and agriculture produces in few Gewog of Trashi Yangtse.

For certain fruits and vegetables, Bhutan Agro Industries Limited is an established market for the farmers if the price and continue supply can be guaranteed by the farmers.

## 5.10 Biogas promotion

### 5.10.1 Households owning Biogas

The numbers of households owning Biogas in the project area is given on Table 40 along with numbers of hours the biogas is used per day by households. One hundred and eighty-six households own Biogas, out of which 137 is owned by treatment group households, and 49 by control group households. On an average the biogas use is 2.05 hours per day for treatment group and 1.76 hours per day for control group.

Table 40. Households owning Biogas and its use per day

	Dzongkhags/Gewogs	Nos of HHs owning Biogas	Biogas used per day (hrs)
	<b>Treatment</b>	<b>137</b>	<b>2.05</b>
1	Lhuntse	15	2.64
2	Mongar	59	2.17
3	Pemagatshel	13	2.05
4	Trashi Yangtse	6	1.75
5	Trashigang	44	1.63

	<b>Control Group</b>	<b>49</b>	<b>1.76</b>
1	Lhuntse	7	1.86
2	Mongar	10	1.76
3	Pemagatshel	32	1.59
4	Trashi Yangtse	0	1.83

### 5.10.2 Trends in use of other energy sources after the biogas

When asked about the trend in use of other sources of energy after the adoption of biogas, 31% of the households reported decrease in use of other sources of energy, while 60% of the households mentioned that the use of other sources has remained the same (Table 41).

Table 41. Trend in use of other source of energy after bio-gas installation

<b>Trend</b>	<b>Number of HHs reporting</b>			<b>%</b>
	<b>Treatment</b>	<b>Control</b>	<b>Total</b>	
Decreased	42	30	72	31.0
Increased	11	9	20	9.0
Remained same	81	57	138	60.0
<b>Total</b>	<b>134</b>	<b>96</b>	<b>230</b>	<b>100</b>

### 5.10.3 Cooking energy sources before biogas

Table 42 presents the sources of energy before the use of biogas. Majority of the sample households from the control and treatment group who use biogas responded that the firewood, electricity, and LPG gas were the main sources of energy before the introduction of biogas.

Table 42. Cooking Energy sources before biogas

<b>Sources of cooking energy</b>	<b>Nos of HHs Reporting</b>		
	<b>Treatment</b>	<b>Control</b>	<b>Total</b>
Firewood, Electricity, LPG gas	127	121	248
Electricity, LPG gas	56	48	104
Firewood, Electricity	28	22	50
LPG gas	9	5	14
Electricity	13	3	16
Firewood	6	2	8
Firewood, LPG gas	0	1	1
Firewood, Electricity, Kerosene	0	1	1
<b>Total</b>	<b>239</b>	<b>203</b>	<b>442</b>

### 5.10.4 Efficiency of biogas compared to LPG and Firewood

The efficiency ratings are presented in Table 43. Majority of the biogas owners rated the efficiency of biogas as good to moderate from both the treatment and control groups.

Table 43. Ratings of the efficiency of biogas compared to LPG and firewood use

Efficiency	Number of HHs reporting		
	Treatment	Control	Total
Good	76	46	122
Neutral	49	41	90
Bad	9	5	14
Total	134	92	226

### 5.10.5 Technical problems on use of biogas

When asked whether there are technical problems associated with the use of biogas, majority of the biogas users (81%) reported that there are no technical problems on use of biogas (Table 44).

Table 44. Technical problems faced in using biogas

Responses of HHs	Number of HHs reporting			%
	Treatment	Control	Total	
No	136	97	233	81
Yes	34	22	56	19
Total	170	119	289	

Biogas owners who responded that there are some technical problems on use of biogas, stated that lack of skilled operators, poor equipment design, and insufficient dung as the major problems on use of biogas. Table 45 presents the type of technical problems faced in using biogas.

Table 45. Types of Technical problems faced in using biogas

Technical Problems	Number of HHs reporting		
	Control	Treatment	Grand Total
Lack of skilled operator	11	12	23
Labor intensive	0	1	1
Poor equipment design	8	13	21
Insufficient dung input	4	10	14
Labor intensive	0	4	4
No problem at all		1	1
<b>Grand Total</b>	<b>22</b>	<b>34</b>	<b>56</b>

## 5.11 Women participation in Agriculture & Livestock Production

### 5.11.1 Asset ownership and women participation

Among the assets owned by households in the treatment group, women own land, livestock, cash and savings account, farm; and house. In the control group, men own land, farm machinery, and house (Table 46). Some of the assets are owned by both men and women.

Table 46. Asset ownership by households - women participation

	Type of Asset	Nos of HHs responding							
		Man	%	Women	%	Both	%	None	Total
	Treatment Group (N=759)								
1	Land	309	41	383	50	60	8	7	759
2	Livestock	212	28	319	42	152	20	76	759
3	Cash and savings (bank account)	127	17	375	49	245	32	12	759
4	Farm	158	21	291	38	146	19	164	759
5	House	284	37	392	52	72	9	11	759
6	Other assets (farm machinery etc)	212	28	72	9	52	7	423	759
	Control Gr (N=600)								
1	Land	297	50	268	45	31	5	4	600
2	Livestock	206	34	210	35	102	17	82	600
3	Cash and savings (bank acct)	130	22	235	39	223	37	12	600
4	Farm	166	28	157	26	87	15	190	600
5	House	282	47	268	45	34	6	16	600
6	Other assets (farm machinery etc)	104	17	42	7	23	4	431	600

### 5.11.2 Operation of farm machinery

The operation of farm machinery and equipment is mainly done by men (Table 47). However, women are also involved in operation of farm equipment like mills, dairy equipment, and post harvest and processing equipment. Some of the equipments are used by both.

Table 47. Operation of farm Machinery and Equipment

	Type of Machines/equipment	Nos of HHs responding							
		Man	%	Women	%	Both	%	None	Total
	Treatment Gr (N=759)								
1	Power tiller	205	27	16	2	4	1	534	759
2	Mills	91	12	62	8	63	8	543	759
3	Post-harvest equip (Sheller, hullers, etc)	40	5	30	4	27	4	662	759
4	Dairy Equipment (milk churners etc..)	27	4	88	12	46	6	598	759
5	Chaff cutter	79	10	20	3	23	3	637	759
	Control Gr N=600								
1	Power tiller	95	16	1	0.2	0	0	504	600
2	Mills	30	5	46	7.7	22	4	502	600
3	Post-harvest equip(Sheller, hullers)	24	4	30	5.0	10	2	536	600
4	Dairy Equipment (milk churners)	13	2	25	4.2	11	2	551	600
5	Chaff cutter	36	6	3	0.5	11	2	550	600

### 5.11.3 Decision making at the household level

Table 48 presents the role of women in decision making at the household level. Majority of the households of treatment and control group responded that women are involved in all decision-making process at the household level ranging from participation in meetings and trainings, sale of assets and purchases of farm inputs, keeping the household earnings and making investments.

Table 48. Decision making at the Household level - women participation

		Nos of HHs responding – Decision by							
		Man	%	Women	%	Both	%	None	Total
Treatment Group (N=759)									
1	Participation in Group/Coop	140	18.4	306	40.3	215	28.3	98	759
2	Participation in training/meetings	135	17.8	360	47.4	248	32.7	16	759
3	Purchase of HH assets like land, livestock..	102	13.4	195	25.7	419	55.2	43	759
4	Sale of household assets	82	10.8	175	23.1	404	53.2	98	759
5	Use of income from sale of agri products	66	8.7	301	39.7	301	39.7	91	759
6	Decisions to borrow money/avail loan	72	9.5	141	18.6	444	58.5	102	759
7	Keep savings from sale of agri produce	57	7.5	340	44.8	221	29.1	141	759
8	Keep earnings from sale of livestock pro.	60	7.9	356	46.9	234	30.8	109	759
Control Group (N=600)									
1	Participation in Group/Coop	128	21.3	235	39.2	175	29.2	62	600
2	Participation in training/meetings	131	21.8	258	43.0	203	33.8	8	600
3	Purchase of HH assets like land, livestock..	65	10.8	105	17.5	381	63.5	49	600
4	Sale of household assets	59	9.8	99	16.5	395	65.8	47	600
5	Use of income from sale of agri products	56	9.3	167	27.8	329	54.8	48	600
6	Decisions to borrow money/avail loan	59	9.8	80	13.3	410	68.3	51	600
7	Keep savings from sale of agri produce	52	8.7	181	30.2	253	42.2	114	600
8	Keep earnings from sale of livestock prod	58	9.7	182	30.3	252	42.0	108	600

### 5.12 Household involvement in Project activities

Among the treatment group sample households, 544 households (72%) reported involvement in Project activities in the year 2020 (Table 49).

Table 49. HH reporting involvement in Project activities in the year 2020

Nos of HHs responding	
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Dzongkhags/Gewogs	No	Yes	Total
Lhuntse	1	114	115
Mongar	58	171	229
Pemagatshel	14	99	113
Trashi Yangtse	26	88	114
Trashigang	116	72	188
<b>Treatment Total</b>	<b>215</b>	<b>544</b>	<b>759</b>
%	<b>28</b>	<b>72</b>	<b>100</b>

Majority of the households reported involvement in Farmers' training on vegetable production, vegetable production inputs and equipment, farmers' training dairy management, and farmers training agri-business, efficient irrigation system management, and sustainable land management (Table 50).

Table 50. Involvement of HHs in Project activities

	Types of activities	Number of HHs reporting involvement		
		Control Gr	Treatment Gr	Total
1	Farmers Training Vegetable Prod	100	195	295
2	Vegetable Production Inputs and equipment	111	141	252
3	Farmers Training Veg Prod & Veg Prod Inputs and equipment	21	92	113
4	Farmers Training - Dairy Mgt, Animal Husbandry, Dairy prod inputs and equipment	21	48	69
5	Farmers Training Veg Prod, Marketing and agri-business (book keeping)	14	36	50
6	Efficient irrigation system – channels Management	1	23	24
7	SLM and Land Development	0	14	14
8	Farmers Training : Veg Prod, Veg Prod Inputs and equipment, Marketing and agri-business	2	7	9
	<b>Total</b>	<b>270</b>	<b>556</b>	<b>826</b>

### 5.12.1 Satisfaction ratings by households on Project implemented activities.

Table 51 presents the satisfaction ratings on the project activities. A total of 316 households (42%) were very satisfied with the project interventions, 216 households (35%) expressed moderate satisfaction. However, 41 households (5%) were not satisfied at all and 18% of the households did not give any response.

Table 51. Satisfaction on Project activities by households

	Type of satisfaction ratings by HHs	Number of HHs reporting Treatment Group	%
1	Not satisfied at all	41	5.0
2	Moderately satisfied	268	35.0
3	Very satisfied	316	42.0
4	No response	134	18.0
	<b>Total</b>	<b>759</b>	<b>100.00</b>



### 5.12.2 Involvement of households in any other Project activities

Table 52 presents the involvement details of the household's responses. Four hundred forty-five households (59%) of the treatment households were not involved in any other projects. From the control group 511 households (85%) reported that they were not involved in any other projects.

Table 52. Involvement in any other project(s) activities in 2020

Project Dzongkhags	Nos of HH -Treatment Group			Nos of HH responding -Control Group		
	No	Yes	Total	No	Yes	Total
Lhuntse	0	115	115	54	21	75
Mongar	115	114	229	207	18	225
Pemagatshel	51	62	113	178	47	225
Trashigang	110	4	114	72	3	75
Trashigang	169	19	188	-	-	-
Total	445	314	759	511	89	600

### 5.12.3 Major problems faced by Households

As a final question of the household interview, the respondents were asked to list 3 major problems faced by households in crop and livestock production. The responses have been summarized in Tables 53, 54, and 55. The number one problem faced is wildlife damages to crops and livestock, seasonal irrigation water shortages, and pest diseases. The second problems rated are wildlife damages, water shortages, and pests and diseases.

Table 53. a) List of Major problem ONE faced by HHs

	Types of Major Problem No 1	Nos of HHs responding			
		Treatment (N=759)	%	Control (N=600)	%
1	Wildlife damage crops	206	27.14	174	29
2	Seasonal irrigation water shortages	163	21.48	136	22.67
3	Pests, diseases, crop damages	82	10.80	74	12.33
4	Lack of access to market and transportation	45	5.93	26	4.33
5	No problem	28	3.69	13	2.17
6	Labor shortage	32	4.22	33	5.50
7	Lack of access to credits/finance	20	2.64	18	3.00
8	Lack of access to inputs and services	11	1.45	9	1.50
9	Crop failure due to weather	10	1.32	12	2.00
10	Lockdown due to COVID	9	1.19	2	0.33
11	Health Problem	8	1.05	5	0.83
12	Drinking water shortage	3	0.40	1	0.17
13	Storage problem	3	0.40	0	0.00
14	Lack of farming knowledge	2	0.26	0	0.00
15	Child education	2	0.26	2	0.33
16	Landslide, soil erosion	2	0.26	1	0.17
17	Not able to meet household expenditure	2	0.26	0	0.00
18	Shortage of land	1	0.13	1	0.17
19	Earthquake destroyed cattle shed	0	0.00	1	0.17
20	No support from gewog office	0	0.00	1	0.17

Total	629	509
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Table 53 b. List of Major Problem TWO faced by HHs

	Major Problem No 2	Nos of HHs responding			
		Treatment (N=759)	%	Control (N=600)	%
1	Wildlife predation to crops	102	13.44	105	17.50
2	Pest, and diseases	64	8.43	45	7.50
3	Water shortages	39	5.14	53	8.83
4	Labor shortages	16	2.11	9	1.50
5	Lack of access to market	14	1.84	15	2.50
6	Lack of access to inputs (agri/livestock)	12	1.58	5	0.83
7	Lack of irrigation channel	9	1.19	10	1.67
8	Lack of machinery	7	0.92	3	0.50
9	Lack of access to finance/credit	7	0.92	8	1.33
10	Heavy rainfall, extreme heat, no rains	5	0.66	1	0.17
11	Lack of proper transportation	4	0.53	8	1.33
12	Production crop failure	3	0.40	0	0.00
13	Lack of farming knowledge	3	0.40	2	0.33
14	Lockdown	2	0.26	1	0.17
15	No problem	2	0.26	1	0.17
16	Child Expenditure	1	0.13	0	0.00
17	Lack of access to proper transportation	1	0.13	0	0.00
18	Lack of green house	1	0.13	0	0.00
19	Drinking water shortage	1	0.13	0	0.00
20	Health problem	1	0.13	1	0.17
21	Low dairy production	1	0.13	0	0.00
22	No food	1	0.13	0	0.00
23	No livestock extension office	1	0.13	1	0.17
24	Shortage of fodder	2	0.26	0	0.00
25	Grand Total	297		268	

Table 53 c. List of Major Problem THREE faced by HHs

	Major Problem No 3	Nos of HHs responding			
		Treatment (N=759)	%	Control (N=600)	%
1	Wildlife damage to crops	15	1.98	25	4.17
2	Irrigation water shortages	13	1.71	8	1.33
3	Insect pests, diseases damage crops	20	2.64	12	2.00
4	Lack of access to market	12	1.58	8	1.33
5	Lack of proper transportation	4	0.53	1	0.17
6	Lack of access to inputs (agri/livestock)	4	0.53	4	0.67
7	Lack of access to finance/credit	2	0.26	0	0.00
8	Lack of irrigation channel	3	0.40	3	0.50
9	Lack of farm machinery	4	0.53	3	0.50
10	Labor shortages	1	0.13	1	0.17
11	Soil erosion	1	0.13	0	0.00
	Total	79		65	

### 5.13 Key Informant Interviews Main Findings

Interviews were held with Gups, Tshogpas, Agriculture & Livestock Extension Supervisors. The main discussion points included the changes observed as a result of the Project activities. In addition the implementation status of the planned activities for 2020 was discussed and recorded. A summary of the Key Informant Interviews Report is placed below. The detailed report is presented in Annexure 1 A.

Some quotes from the Key Informants

- *“With the help from CARLEP we got training in agriculture activities and the Project supported with green houses, water tanks, sprinklers, packing and drying machines. Marketing of farm produce is not a problem for us as we sell all our produce to schools.”* (Mongar Vegetable Group).
- *“After project interventions, business and trade has increased in the gewog. Two new shops have opened in the Gewog recently. With the CARLEP project supplying agriculture and livestock inputs, we became more motivated and worked hard to produce more”.* (Khangma Vegetable Group- Sangay Zangmo)
- *“Business has increased in the gewog due to road connectivity and our income levels have increased in the last few years. Marketing is not a problem because we sell all milk we produce to Chenari”.* (20 members Dairy Group from Chaskar)
- *Marketing is not a problem, we send all the milk to Chenari, Trashigang. PMU milk tanker takes all the milk from the milk collection centre. After the establishment of Dairy Group in the gewog, the living standard of farmers has improved”* (Ngatshang Dairy Group - Chairman – Sangay Dorji)

Chaskar Agriculture, ES (Chenga Tshering)

- a) Most of the farmer have expanded their cash crops and livestock enterprises and took opportunity of Project support to increase cropping area especially the vegetables and enhance cash income.
- b) Emerging cash crops products in the gewog are Potato, fruits and vegetables.
- c) 80% of the participants are women who participate in economic activities over the past few years
- d) There are no overlapping of inputs/activities with the other project.
- e) There are 10 groups, 4 dairy group and 6 vegetable group. Number of women entrepreneurs in agriculture and livestock during the last few years is increasing.

Chaskar- Dairy Group

- a) With the help of CARLEP, farmers got training in agriculture and livestock activities. Business and trade has increased in the gewog,
- b) There is an increasing trend on share of women and children engagement (as family labour) in agriculture and livestock activities.

- c) GYT usually involve in planning for the group formation. GYT usually involve in planning for the group formation.
- d) There are no adverse social impacts and there is no conflict on use of resources with the outsiders as of now, and no adverse impact on environment and biodiversity.

#### Mongar vegetable group

- a) Radish, Cabbage, Broccoli, Cauliflower, Carrot, Tomato, Beans, and Potato are the emerging cash crops
- b) Men and women have equal access to loan and related services for business purpose. There are 2 numbers of women entrepreneurs in agriculture as of now.
- c) .The housing conditions of the poor households also has improved with CGI roofing
- d) There is no conflict with the outsider on resources sharing

#### Ngatshang Agriculture (EO)

- a) Among several activities implemented, expansion of protected agriculture (PA) and reversion of fallow land back to farming would bring the maximum impact, the project should document the impact assessment of lead farmers.
- b) CARLEP is the main funding project in the east. There is minimal budget from central programmes and gewog.
- c) Marketing of vegetable produce has improved with linkages to schools. Yes, vegetable production and business has increased in the gewog.
- d) There is an increasing trends in engagement of women and children in agriculture and livestock activities..

#### Ngatshang Gewog Report (Mangmi)

- a) Vegetable and livestock business has increased in the gewog.
- b) Emerging livestock product is milk and in agriculture potato, broccoli, chilli, beans, and pumpkins are emerging cash crops
- c) There are 3 number of women entrepreneurs in agriculture and livestock during the last few years
- d) Ngatshang Livestock (Sonam Norbu, Sr ES)
- e) Among several activities implemented, dairy development activities, such as dairy products are linked to KIL and have resulted in maximum impact.
- f) All the dairy group members have been the recipients of the Jersey procured through subsidy provided from the project.

- g) Trends on participation of women in economic activities during the last 5-10 years has increased, access Loans and related services for women for business purpose, number of women entrepreneurs in agriculture and livestock during the last few years has increased. Three dairy groups now..

#### Yurung Agri Report

- a) There is expansion of cash crops such as cardamom and ginger which brought positive income to the people. There is a increase in business and trade in the Gewog,
- b) The new products introduced in the Gewog are hybrid maize, quinoa, winter chilli and spring potatoes.
- c) Over the years, there are more numbers of empty households and fallow lands
- d) With improved inputs for diary production in the Gewog, diary production expanded and brought positive income change of the farmers.

#### Yurung Gewog Report (Sangay Zangmo, Khangma Vegetables Group)

- a) The main emerging cash crops in the Gewog are lady finger, watermelon, passion fruit and pineapple
- b) After project intervention, business and trade increased and two new shops have opened in the Gewog recently. With the CARLEP project supplying agriculture and livestock inputs, we became more motivated and worked hard to produce more.
- c) The living standard of poor people is same because they are not interested in agriculture and livestock work. After project intervention, business and trade increased and two new shops opened in the Gewog recently.

#### Khar Gewog Report

- a) Both men and women come for community/Gewog project planning and implementation.
- b) The main and emerging cash crops in the Gewog are ginger, avocado and pineapple.
- c) Shumar Gewog Report (Mangmi Sonam Dorji)
- d) New crop introduced is avocado. Farmers are planning to expand agricultural, horticultural, and livestock production.
- e) There are no new shops in the Gewog now but there are plans to start few shops in Denchi town. Business and trade increased with increased in project support.

#### Shumar Livestock (Norbu Gyeltshen, ES)

- a) Expansion of improved dairy shed and sourcing of improved dairy breeds for milk production would bring maximum impact farmers.

- b) No conflict with outsiders on resources use and no adverse impact on environment and biodiversity.
- c) Most farmers expanded their farming after getting support from the project more farmers growing more cash crops, and rearing livestock for income generation

#### **5.14 Factors contributing to the success of CARLEP activities and sustainability**

The main reasons behind success of CARLEP activities are interest and motivation of the farmer. Other reasons are cultivatable land, no water shortage issues, good road condition to market accessibility, good market and limited alternative source of income such as carpentry, contracts and so forth. However, the challenges for future success are for the Gewogs with not good cultivable land, long distance to the market especially with poor road conditions, water shortages and no other source of income such as carpentry, contracts.

For sustainability of CARLEP activities, it is time to discuss and plan for sustainability of CARLEP activities as CARLEP will complete by 2025. The following suggestions are made to address the sustainability issues.

##### **5.14.1 Connecting and collaborating with the market chain actors**

So far CARLEP have focused more in production and the result is shown with the increase of production. However, now need to focus on marketing and connecting farmers to the buyers and in value chain addition to prevent post harvest lost. Some of the existing markets are Bhutan Agro., OGOP and Kholongchu for agriculture or livestock and Kholongchu for livestock and agriculture.

##### **5.14.2 Value addition, packaging and post harvest**

It is also suggested to set up enterprise, explore post harvest and value addition to the products such as packaging to the farm produces.

##### **5.14.3 Capacity development of entrepreneurs**

It is also advice to ensure entrepreneurship trainings for the upcoming entrepreneurs. This will help to build their capacities and expand their enterprises too. For instance, the cookies sold by the Mongar youth group is not as tasty as the cookies sold by another entrepreneur in Thimphu (Drunga ghu). Overall, the youth groups met so far is keen and interest to expand their business. They need capacity building.

##### **5.14.4 Continued Project support to Youth Groups**

With project support to the youths, there are hardworking and enthusiast youths taking up farming activities. They also play as a model youth farmer in their respective Gewogs. It is understood they have been supported by the respective Gewog Agriculture and Livestock officials. However, overall for their continued success and expansion it is important to have a knowledge sharing platform for them. This may be developed through the guidance of Knowledge Management Officer. Some of the groups working smoothly may need further capacity building too as most of them are with limited education and experiences. Any upcoming trainings, course, seminar and so forth can be shared in this platform. This way it may also help them network and share among themselves too.



#### **5.14.5 Success of CARLEP activities depend on Gewog Agriculture and Livestock Extension**

The Lead Farmer model is going well. And, the Agriculture and Livestock Officials are trying their best to support and develop communities of their respective Gewogs. However, it is noted differences on success of CARLEP activities between Gewogs solely on the Gewog Agriculture and Livestock Extensions capacity, hard work, interest and enthusiasm. As a result, it is suggested, after yearly reviewing Gewogs outcome to support in capacity building of these officers for sustainability of the programme.

#### **5.15 Key Issues to be addressed by CARLEP**

##### **5.15.1 Pricing and consistency in quantity to be supplied**

With support from CARLEP, productivity does not seem to be an issue and this is also confirmed last year as with COVID the farmers have increased their production. The main issue is pricing and continued supply by the farmers once they are linked to the buyers. The buyers are schools, institutes and companies. Setting up a market chain through CARLEP should be prioritized to connect farmers with the buyers. With pricing and quantity always being an issue, it can be set up through participatory market chain approach.

##### **5.15.2 CARLEP support to groups**

It is learned that most of support from CARLEP goes towards groups. This is reasonable and justifiable. However, in the process if any individual progressive farmers are also capable to do the same activity, they may be given similar support depending on the type of activity.

##### **5.15.3 Awareness and sensitization on CARLEP**

In both treatment and control groups, some beneficiaries are not aware of CARLEP. For this reason, we had to continue asking them follow up questions. Continued awareness and sensitization on CARLEP is needed. This can be done using suitable methods including field visits in the Gewogs not frequently visited.

##### **5.15.4 Pro poor and vulnerable household**

This is a target intervention, and in this approach the program aims to support Gewogs and communities that have limited road access, relatively poor as per poverty incidence rate and households with highly vulnerable to impact of climate change.

Regarding support for the poor and vulnerable households, at the Gewog level few Gewogs are aware of pro poor support and some Gewogs confirm they do not receive pro poor support. However, some of them are not aware of pro poor support. Moreover, there has not been much development with the pro poor support targeted by the project. There is a need to monitor and assess status on pro poor support extended to the communities in the project area. It is suggested to set up criteria for providing this type of support in line with the Dzongkhag and IFAD priorities and focus. It is also suggested that the pro poor interventions could be linked with the programme of Ability Bhutan Society (ABS), a CSO that supports People with Disabilities in income generation activities such as farming to promote livelihood. They do this through the project- Community Based Rehabilitation project.

### **5.15.5 Gender**

In terms of gender, it is mostly women involved in agriculture activities. There is a misconception that if more women (in terms of quantity) are project beneficiaries such as more women in groups, then this implies gender equality in project activities. For a gender equality and equity, there is a need for gender sensitization of the implementing and monitoring offices. A gender study may help to understand gender gaps.

### **5.15.6 Monitoring and Evaluation**

While conducting the Annual Outcome Survey, it was learnt that the OPM team visits all major activities in the gewogs as well meets all sector heads in the Dzongkhags. The Monitoring & Evaluation Officer and Component Managers of the Project (Agriculture and Livestock) also make field visits in their respective sites. It was observed that the frequency of the field visits could be increased as a part of regular monitoring. This will motivate field officers and help address field problems more efficiently.

### **5.15.7 Pricing of products**

Farmers do not seem to follow proper costing procedures to set prices of farm produce. It is often based on previous year's price or the price in the distant markets. Setting a very high price without sound basis prevents consumers to purchase. If they follow proper cost of production and fix prices keeping reasonable profit margins, the sale volumes will increase to generate more income.

### **5.15.8 Peak season surplus produce**

Generally, it is observed there is competition among farmers to sell their produce in the region mainly during high production in the peak seasons. The surplus produce therefore, does not find good market. Therefore, cold storage facilities and drying equipment could help farmers to reach their produce to the main towns in the western region such as Thimphu and Paro. This will help with import substitution of vegetables and other products.

### **5.15.9 Problem of ever rising Feed prices**

The continued feed price increase discourages farmers to take up production. The additional cost further increases the price of livestock produce. There is a need to assess cost of feed production and regulate feed prices. Commercial feed production using locally available materials with additions of necessary supplements could help produce feed at a reasonable price to promote livestock production.

### **5.15.10 Time duration to conduct Annual Outcome Survey**

Given the scattered project areas, isolated households, and large sampling size, it has been experienced that 45 days is not sufficient to conduct this survey properly. Therefore, longer time duration of at least 75 days is suggested for this survey so that the desired results could be achieved.

## Annexure 1. Findings of the Key Informant Interviews

### REPORT ON KEY INFORMANT INTERVIEWS –

Interviews were held with Gups, Tshogpas, Agriculture, Livestock Extension Supervisors and livestock/vegetable group members. The main discussion points were on the changes observed as a result of the Project activities

- Economic Changes in the gewog
- Agriculture/Livestock
- Access to Markets
- Other Services
- Impact on Women
- Community Participation
- Any Adverse Social Impacts
- Specific Comments on Project Activities
- Changes occurring in the agricultural & livestock output and practices
- Describe new opportunities due to the project
- Opening of new shops and commercial enterprises
- Beneficiary participation

### 5.16 Chaskhar Agriculture Report

Summary of main observation noted from the Key Informant Interviews

- General Observations	Among several activities implemented, Land development with adequate water supply would bring the maximum impact initiated by the project. Most successful activities and that are likely to grow should documented by the CARLEP. ES is not sure about any other intervention that was desired but not covered. There are no overlapping of inputs/activities with the other project. For the continuity and sustainability, they hope for the other project to come otherwise should adjust from the Royal Government of Bhutan (RGoB) fund. Unlike other project, CARLEP project is the biggest project for the agriculture/livestock activities and should consider as the best in terms of services and inputs support.
- Economic changes	The main prospects due to project are to provide lead farmer training, inputs support due to which the household income level has increased and standard of living improved. Most of the farmer had expanded their cash crops and livestock enterprise and took opportunity of supports, they increased the cropping area especially the vegetables, although farmers faced difficulty to market their farm produce but the manage and generate the income. Unlike past, business and trade has increased in the gewog. ES is not sure about the reduction of transport expense.
Agriculture / Livestock	The main emerging cash crops products in the gewog are Potato, fruits and vegetables. The productivity trends of food and cash crops once the road and communication are bit improved. There will be chance of continued marketable surplus of vegetable during peak season. Chilli and hybrid maize are the two new crops introduced in the gewog.
- Access to markets	There are no market within the gewog but farmers sell their produces in Central Schools, they even sell their produces to Yadi town, Mongar town and to travelers at roadside. ES is not sure about the future demand of agriculture and livestock products. Most Farmers either hire the vehicle/they also transport by bus if the commodity is less.
- Other services	No shop till now, so access to fair price shops and public distribution system is done by the seller themselves. Chaskhar gewog is access to internet facilities but no banking facilities, they have to go Yadi to avail banking services
- Impact on women	80% of the participants are women who participate in economic activities over the past years. ES is not sure about assess to Loans and related services for women for business purpose. There are no women entrepreneurs in agriculture

	and livestock during the last few years. Trends in share of women and children engagement (as family labour) in agriculture and livestock activities has increased over the year.
- Community participation	ES is not sure about extent to the involvement of community/GYT in project planning and implementation but few farmers and GYT members take part especially for the project where more expenditure has to be spent.
Any adverse social impacts	No idea whether there is conflict with outsider on resources use or not and also ES is not sure on impact of environment and biodiversity (use of forest products

### 5.17 Chaskhar Dairy Group Report

General Observations	Yes, we know about CARLEP, we expect more help and support from CARLEP like before.
Economic +changes	Expansion of cash crop/livestock enterprise increased in income generation (20 members in the group). Marketing is not a problem because we sent all milk to Chenari PMU. Business has increased in the gewog due to road connectivity.
Agriculture/livestock	The main and emerging cash crops/ livestock products in the gewog is milk, the new products is milk. We sell only milk to chenari, trashigang. .
Access to markets	Yadi town is the nearest market of the gewog, we send our livestock produces to Chenari, Trashigang which is 80 km away from gewog. PMU, Chenari milk tanker collect the milk from milk collection centre from the gewog. So we use their vehicle as a means of transportation
Other services	Fair price of produce is fixed by agent in mutual understanding, government development program like banking facilities is available only in Yadi town, access to internet within the gewog.
Impact on women	All woman are access to loan and related services for business purpose. There are 10 group, 4 dairy group and 6 vegetable group which mean the number of women entrepreneurs in agriculture and livestock during the last few years is increasing. Trends in share of women and children engagement (as family labour) in agriculture and livestock activities are increasing, children helped during their vacation and holidays.
Community participation	GYT are directly involved in planning and monitoring.
Any adverse social impacts	There are no conflict on use of resources with the outsider as of now, no impact on environment and biodiversity.
Changes occurring in the agricultural & livestock output and practices	Number of farmers had increased in growing more cash crops and rearing livestock for income generation. Most of the farmer has already expanded their farming in agricultural, horticultural, and livestock production, there is no new crops introduced in the gewog.
Describe new opportunities due to the project	Farmers who are doing well has the opportunity to capture market other than Trashigang. They only sell milk and has marketed, living standard of poor and vulnerable groups has improved, they could afford to buy LPG cylinder and stove for cooking.
Opening of new shops and commercial enterprises	No single shops opened up in the gewog recently, but business and trade has increased after the project started.

Beneficiary participation	With the help and support from the project, there is increase in group formation of vegetable and dairy group. Local representative plans and provide information to community for implementation.
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### 5.18 Chaskhar Gewog Agriculture & Livestock Report

Economic changes	Expansion of cash crop and livestock enterprise is improving in the gewog. Marketing of farm produce has been easier; farmer sells the produce to Yadi and Mongar town. Business has increased in the gewog.
Agriculture/livestock	Potatoes are the main emerging cash crop in Chaskhar gewog. There is no new crops introduced as of now.
Access to markets	Yadi town is the nearest town 7 km away from the gewog centre. We send our livestock producers to Chenari, Trashigang which is outside of the gewog. We use PMU milk tanker and sometime private vehicle for transportation of our products.
Other services	Agents and middle man fixed the fair prices of the produces, government's development programs and other related services like banking is in Yadi town and there is access to internet in the gewog.
Impact on women	Loan and related services are also accessible to women as well, there are no women entrepreneurs in agriculture and livestock during the last few years. Trends in share of women and children engagement (as family labour) in agriculture and livestock activities are increasing.
Community participation	GYT usually involve in planning for the group formation.
Any adverse social impacts	There is no conflict as of now on use of resources use with the outsider. No impact on environment and biodiversity as of now.
Changes occurring in the agricultural & livestock output and practices	Number of farmers who has started growing more cash crops or livestock rearing for sale is increasing within the gewog. Most of the farmer has already expanded their agricultural, horticultural, and livestock production. No new crops introduced as of now. Living standard of the farmers has improved in the few years.
Reducing Poverty through Employment & economic opportunities	Farmers have started producing more agriculture and livestock product and capture market. There is no new products marketed, they have been selling the same products like before. Some of the vulnerable households has improved a bit and the housing condition of the poor households is same, no change.
Opening of new shops and commercial enterprises	There is no single shop opened in the gewog recently but the business and trade has increased drastically in the gewog.
Beneficiary participation	With the help of CARLEP, farmers got training in agriculture and livestock activities. Farmers are benefitted with cement, sand, seed, CGI sheet, green house, pipe, fence etc. GYT, local representative discuss on issues faced on behalf of farmers and plans as per their requirements and needs.

### 5.19 Mongar Vegetables Group Report

Economic changes	The prospects of farmers are planning to expand our group for increase in income generation. Marketing of farm produce is not a problem because we sell to schools and increase income. Business has increased in the gewog. We capture the market in Nganglam as well.
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Agriculture/livestock	The main and emerging cash crops are Raddish, Cabbage, Broccoli, Cauliflower, Carrot, Tomato, Beans and Potato. We had tried new crops like tomato which was never cultivated before in our chiwog.
Access to markets	Kilikhar is the nearest market for our group. The even sell our products to outside market like Nganglam, pemagatshel. For transportation and marketing purpose of the products, we hired private vehicle, some they come to us and collect the vegetable.
Other services	Middle man are the one who looks on fair prices shop and public distribution system, access to government's development programs and other related services like banking in Mongar town and access to internet as well.
Impact on women	Every man and women are equally accessible to Loan and related services for business purpose. There are 2 numbers of women entrepreneurs in agriculture and livestock during the last few years in Kilikhar. Trends in share of women and children engagement (as family labour) in agriculture and livestock activities from last past year, children usually help their parents during holidays and vacations.
Community participation	GYT are directly involved in planning and community in implementation.
Any adverse social impacts	There has been no conflict with the outsider on resources use of the gewog, and also no impact on environment and biodiversity
Changes occurring in the agricultural & livestock output and practices	Farmers started growing more cash crops or livestock rearing for sale for income generation, we are not sure about other groups in the group but we are planning to expand our group. The new crop introduced was tomato and we are not sure what new development taken place due to the project.
Reducing Poverty through Employment & economic opportunities	We have the greatest opportunities to capture the market in Mongar Dzongkhag as well as other dzongkhag due to the project, as of now we have marketed tomato as a new product. Some of the vulnerable groups improved their living standard, in Kilikhar, housing condition of the poor households changed, roofing of house.
Opening of new shops and commercial enterprises	Not sure about new shop opened in the gewog recently, but business and trade has increased compared to past years.
Beneficiary participation	With the help from CARLEP we got training in agriculture and livestock activities and provided with green house, syntax, sprinkle, packing machine and drying machine. Gewog helped to market if we are unable to sell all our produces.

## 5.20 Ngatshang Agriculture Report

General question – Activities that would bring maximum impact	Among several activities implemented, expansion of protected agriculture (PA) and reversion of fallow land would bring the maximum impact, the project should document the impact assessment of lead farmers. There is no other project intervention desired but not covered, no overlapping of inputs with other project. Farmers are made aware on the sustainability of the activities after end of project life. CARLEP is the main funding project in the east. There are minimal budget from central and gewog.
Economic changes	The main prospects of project is income generation improvement, self-sufficiency in vegetable production and consumption by individual households.



	Vegetable production and income generation increased. Marketing of vegetable produce has improved in vegetable group as they are linked to schools. Yes, vegetable business has increased in the gewog. Not sure about the reduction of transport expense of the farmers.
Agriculture/livestock	The main and emerging cash crops is Potatoes and vegetables in the gewog. Productivity trends of food and cash crops once the road and communication are improved. Not sure about continued marketable surpluses of agriculture and livestock products. We cultivated hybrid chilli as new crop in the gewog, Human wildlife conflict and army worm is common in cereals and vegetables.
Access to markets	Yadi town is few hundred meter away from gewog. The product are send to other Dzongkhag through local traders. Demand for agriculture products would definitely increase due to awareness on organic agriculture. We use hired private vehicle for transportation of our product for marketing purpose.
Other services	Access to fair price shops and public distribution system is fixed either by seller or buyer, government's development programs and other related services like banking is available in Yadi, access to internet
Impact on women	Trends of participation of women in economic activities has increased over the years. Lender BCCI, there is micro bank that lease loan to women for business purposes. No women entrepreneurs in agriculture and livestock during the last few years. Trends in share of women and children engagement (as family labour) in agriculture and livestock activities has increased.
Community participation	Involvement of GYT, besides LG members presences in GT, few representatives from chiwog also present/attend the GT meeting.
Any adverse social impacts	Not sure about conflict with outsiders on resources use and impact on environment and biodiversity (use of forest products)

### 5.21 Ngatshang Dairy Group Report

Economic changes	Due to expansion of group we have increase in income generation. Marketing is not a problem, we sent all the milk to chenari, Trashigang. Business has increased in the gewog.
Agriculture/livestock	The main and emerging livestock products in the gewog Milk only.
Access to markets	Yadi town is the nearest market of the gewog. Access to outside markets – PMU, Chenari, Trashigang. PMU milk tanker takes all the milk from the milk collection centre, no need for other transportation.
Other services	Fair price of produce is fixed by PMU. Access to internet and we have banking facilities in Yadi town (BDBL).
Impact on women	Loan and related services are also accessible to women for business purpose. 3 milk group of women entrepreneurs in agriculture and livestock during the last few years. Trends in share of women and children engagement (as family labour) in agriculture and livestock activities. Women and children equally takes part in agriculture and livestock activities.
Community participation	GYT involve in planning and community in implementation.
Any adverse social impacts	No conflict with outsiders on resources use and no impact on environment and biodiversity (use of forest products)
Changes occurring in the agricultural & livestock output and practices	Farmers started growing more cash crops or livestock rearing for sale started rearing more cow for better milk production. Farmers planning to expand agricultural, horticultural, and livestock production, farmers planning to expand agricultural, horticultural, and livestock production

Reducing Poverty through Employment & economic opportunities	New opportunities due to the project is to capture market in large areas. new products have been marketed milk only. Due to milk group formation introduce in gewog, living standards has improved, housing conditions of the poor households has been improved.
Opening of new shops and commercial enterprises	Not sure how many shop opened up in the gewog recently, compared to past years, business and trade has increased.
Beneficiary participation	With the helped and support form CARLEP, Provided awareness on benefit of joining the group. GYT helped in framing the plan and community implements the frame planned.

## 5.22 Ngatshang Gewog Report – Agriculture and Livestock

General – About the CARLEP Project	Yes, we know about CARLEP project, we need continuous support in future as well, provide more funding for agriculture and livestock activities.
Economic changes	Vegetable are sold to Mongar town and local market, milk to chenari, PMU, definitely there will be increase in income generation. Marketing of agriculture and livestock produces is not are issues in Ngatshang gewog, they sell to Yadi town, Mongar town, local market and schools. Vegetable and livestock business has increased in the gewog.
Agriculture/livestock	Emerging livestock product is milk and agriculture were Potato, Broccoli, chilli, beans, pumpkin. New crops/products introduced is Hybrid Chilli.
Access to markets	Yadi town, half km away from the gewog centre which is nearest market of the gewog. We even send our agriculture and livestock produces to Trashigang town. Some farmers use their own car and some they hire private vehicle for marketing purpose.
Other services	Agent is involved in fair price shops and public distribution system, access to internet and we have BDBL in Yadi town.
Impact on women	Loan and related services are also accessible to women for business purpose. There are 3 number of women entrepreneurs in agriculture and livestock during the last few years. Trends in share of women and children engagement (as family labour) in agriculture and livestock activities. Children usually helped their parents during
Community participation	GYT provides with key information regarding agriculture and livestock (RNR).
Any adverse social impacts	No conflict with outsiders on resources use and no impact on environment and biodiversity as of now.
Changes occurring in the agricultural & livestock output and practices	Farmer started growing more cash crop and rear livestock due to better marketing scope. Farmers planning to expand agricultural, horticultural, and livestock production. New crops/products introduced is hybrid chilli. Farmers are aware on how to use the funding provided by the project efficiently
Reducing Poverty through Employment & economic opportunities	Farmers have the opportunities to expand the milk collection centre in the gewog, Chilli is new products have been marketed, living standard of poor and vulnerable groups improved to some extent, some housing conditions of the poor households improved.
Opening of new shops and	Ans: No new shop opened up in the gewog recently, business and trade increased after the project as compared to past.

commercial enterprises	
Beneficiary participation	With the support from CARLEP, number in group formation increased with the support form CARLEP. GYT helped in providing training and awareness to new technique and community implement.

### 5.23 Ngatshang Livestock Report

General – About the CARLEP Project	Among several activities implemented, Dairy development activities, such as dairy group product are being linked to KIL bring maximum impact. There should be frequent monitoring. There is no project intervention was desired but not covered, no overlapping of inputs/ activities with other projects. Dairy group activities will be continued and sustain the group activities by connecting to KIL, Chenari, Trashigang and school feed program. In the eastern region, CARLEP serve as main funding source aside from the central and gewog.
Economic changes	The main prospects is income of farmer has increased drastically from CARLEP funding subsidy. All the dairy group members has been the recipients of the Jersey procured subsidy provided from the project. All dairy group within the project supported has increase the milk production. Many farmers in the gewog has joined dairy group and thereby increase the dairy milk production. Due to linked with KIL, Chenari Milk Processing Unit, farmer in the group felt easier in marketing, business and trade in the gewog has increased. Dairy group supply milk directly to MPU, KIL Chenari. Therefore, public don't use means of transportation.
Agriculture/livestock	The main and emerging cash crops/ livestock products in the gewog Dairy product (milk). Productivity trends of food and cash crops once the road and communication are improved. No marketable surpluses of agriculture and livestock products as of now. less payment to milk collector, we group face difficulty in supply milk to MPU, KIL
Access to markets	Yadi town, less than 1 km, is the nearest market of the gewog. Access to outside markets is Chenari, MPU, Trashigang. There will be increased in demand for livestock in future. Use private vehicle for transportation of products for marketing purpose
Other services	MPU, Chenari, Trashigang is involved in fair price shops and public distribution system, gewog has access to internet and banking facilities in Yadi town.
Impact on women	Trends on participation of women in economic activities during the last 5-10 years has increased, access Loans and related services for women for business purpose, number of women entrepreneurs in agriculture and livestock during the last few years has increased to 3 dairy group. Trends in share of women and children engagement (as family labour) in agriculture and livestock activities is increasing slowing
Community participation	GYT take parts in planning and community help to implement the planned activities.
Any adverse social impacts	No conflict with outsider on resource use and no Impact on environment and biodiversity (use of forest products)

### 5.24 Menbi Livestock Report

Formation of farmer groups and dairy groups has a lot of positive impact on the business and the community. The project interventions are in place and going well. Project coordinators combine the resources from projects like GEF and RAMCO with CARLEP to implement these projects' plans. The

sustainability of project after project life would be challenging without funding. CARLEP has brought more change to the lives of the farmers than the other projects, as it has provided resources and ideas to the community. However, the project funding is not enough to cover all the farmers in the groups, and the farmers who are not in groups do not get much support. The school has started to buy more products from the groups, so the farmers have grown more cash crops and sold dairy. Formation of farmer groups has improved the community's access to market and, there is increased business and trade in the Gewog. The farmer's in groups help each other and has led to reduction in transportation expenses. The gewog's main and emerging cash crops/ livestock products are cheese, butter, and eggs. Farmers are able to send their product outside of the gewog more quickly because of the improved road conditions. The farmers are not left with much surplus because schools and institutions take almost all the products. No new products as of now, but gewog is planning to introduce a new yogurt machine. Once the yogurt machine is established, farmers anticipate there will be a demand for yogurts. The farmers manage transportation either by using private or public vehicles (Buses). There is no problem with pricing because the groups discuss the prices before they sell the products. The internet is being connected in the offices, but cellular internet is available. The farmers here mostly use BDB for banking. The number of women in economic activities has increased over the years. There is fairness in the availability of loans between men and women. The people usually loan from CSI. The number of entrepreneurs has remained the same, but people have submitted applications to start agribusinesses in the gewog. The number of women who participate in agriculture/ Livestock activities is more than the men. The community cooperates with the extension agents. The people come forwards when they have doubts or problems, and the Gewog and the extension offices make all the resources provided by CARLEP available to the community. There haven't been many conflicts with the outsiders except for the water sources for irrigation. The construction of roads has destroyed a lot of wild animal habitats.

### 5.25 Menbi Agriculture Report

**Discussion points** –Noted : Discussion on project progress, social impact and issues, community participation, identify priorities of the beneficiaries and assess status of women and children participation in farming.

Terrace Consolidation (both wetland and dryland) will bring maximum impact, and the progress of terrace consolidation and group formation should be documented. The inputs and activities do not overlap because there aren't any other projects in the Gewog currently. Farmers are planning on starting bigger cash crop/ livestock enterprises in the gewog. However, farmers do not have enough market to sell their products. The main and emerging cash crops/ livestock products in the gewog are chillies, onion, cabbage. Improved roads and communication have made access to farm resources and markets easier than when the roads were not well developed. Farmers are always left with a surplus for vegetables like cabbage, chillies, and Broccoli. The new crops introduced in the village are rajma beans, onion, and mushroom. The mushrooms have to be imported from Paro, so there are transportation charges and the risk of damage. Farmers manage their own vehicles, but the extension office informs RAMCO and manages the vehicles if they cannot arrange by themselves. There is a high possibility of demand increasing for onion, chillies, and tomatoes. The extension personnel try to keep the cost of production less than the profit gained. The people have a good connection to the cellular network, internet, and banking. Women's participation has increased. Even the chairperson in the groups is mostly women. There is no discrimination, but most men are the ones who avail loans. The number of women entrepreneurs is very less in the gewog. Most farmers are women in places like Zhinghar. The GYT, extension agents, and the community are engaged in every process of implementing the CARLEP plans. There is no conflict with outsiders as of now. The cutting down of trees for electric fences have destroyed a lot of forest areas.

### 5.26 Gangjur, Lhuentse Livestock Report

**Discussion points** –Noted. Discussion on project progress, identify social impacts, review community participation, identify needs and priorities of the farmers of the project area and assess participation of women in farming.

The respondents feel that focusing on dairy production will bring the most development and income for the farmers in the village. The project has covered all the key areas that need to be covered. Overlapping of inputs and activities is expected and unavoidable because some projects have similar or the same plans, so project coordinators try to find ways to use the resources from the projects with similar objectives and implement their plans together. Sustaining the project after the project life would be very difficult; however, with guidance and support, the project can sustain. More farmers are showing interest in poultry farming and are a good source of income for the farmers. The formation of groups has improved market access for the farmers, and that has increased revenue. The emerging cash crops/ livestock products in the gewogs are eggs, butter, and cheese, and productivity has increased since roads and communications have improved. The village tried starting a fishery, but it got cancelled because farmers were selling fish illegally. People manage their transportation, but the government managed the vehicles during the national lockdown. The Gewog holds meetings to fix product prices, so the pricing is fair. The Gewog has access to the government's development programs, banks, and a good mobile internet connection. Women's participation in farming has increased dramatically, and there is no inequality, but getting loans, in general, is difficult because of the time it takes to get them. The number of women engaging in farm activities has always been higher than men in the Gewog. The budget from the project gets to the Gewog office, and then the Gewog office makes the resources available for the farmers. Then the farmers are trained, and then they cooperate with the extension agents to implement the project plans. There has not been any conflict with outsiders on resource use, but deforestation plays a significant role in water sources drying up in the village.

### 5.27 Tshenkar, Lhuentse Agriculture Report

**Discussion Points : Project** implementation, social impacts and issues, review on community participation, identify prorates needs of the beneficiaries and assess status of women and children participation in relation to farming.

The project has helped in group formation for milk and monitoring and field visit helps in getting exposure and knowledge sharing. The project can be sustained by connecting to markets such as school feed program, subsidies (70 – 30). However, expect continuous support for training in related fields from the project. The main sources of income are from milk and butter and the volume of milk has increased. The population of Jersey has also increased the income generation. Sometimes there is also excess supply. The business and trade increased within the Gewog, especially poultry. Farmers have easier access to feeds, production increased, sufficiency in egg, and 24 hours UV light. Transport cost is reduced as the poultry farm owners have their own vehicles. The egg production has increased and with road and communication the surplus is sent to Mongar and Limithang. The farmers have access to all basic services such as school and hospitals. Pricing is done by the farmers, During COVID time we controlled the price. With school pricing is fixed between farmers and school on a contract. Everyone has access to bank, telephone and mobile. All women have equal access as men and there are 2 women entrepreneurs in the village. Agriculture works is mostly done by women and children. Children help during holidays. Community is not part of planning, but they are part in implementation. There is no conflict and negative impact to environment or bio diversity.

### 5.28 Gangjur, Mongar, Gewog report by Tshogpa

**Discussion points** –Noted - Discussion on project progress, identify social impacts, review community participation, identify needs and priorities of the farmers of the project area and assess participation of women in farming.



The farmers hope to get access to more improved equipment both for agriculture at an affordable rate. After the CARLEP project, the number of farmers taking up poultry has increased, and some farmers have started preparing their lands for poultry farming. The farmer's group has helped farmers earn better and sell their vegetables easier. The farmers have access to government services, and there is no inequality between men and women in their village. The number of women entrepreneurs in the livestock and agriculture sectors has increased. The farmer group also has more women than men. There is minor conflict among Gangzur and Tamgmachu over the timbers as the people of Tangmachu take timber from Gangzur. The cutting down of woods had led to the drying of water sources which is quite problematic for villagers. The farmers have started producing cash crops and have planted new fruits like Japanese watermelon and passion fruit. As more people take up agriculture and livestock farming, people's living standards have improved as they can either afford new places or renovate their homes. The gewog office made the facilities provided by CARLEP available to the farmers, and the farmers cooperated with the extension agents to implement whatever activities CARLEP had planned for the gewog.

### 5.29 Tsenkhar, Lhuentse Livestock Report

**Discussion Points** - Discussion on project implementation, social impacts and issues, review on community participation, identify prorates needs of the beneficiaries and assess status of women and children participation in relation to farming.

The maximum impact was from group formation initiative for milk and value chain. Frequent monitoring and inspection by PMU must be documented and monitoring and field visits helps officers with exposure and knowledge sharing. There are no overlapping inputs or activities and the project can be sustained by connecting to markets such as school feed program, subsidies (70 – 30). However, expect some continuous support such as training in the related field from extension supervisors. The main sources of income are from milk and butter and the volume of milk has increased as the population of Jersey is high. The other sources of income are semi commercial farms and bio gas production. The marketing is easier and there is increased business and trade in the gewog. In regard to poultry, the trade is going on within the gewog, but also beyond the Gewog like Mongar and Limithang. Farmers have easier access to feeds, production increased, sufficiency in egg, 24 hours UV light. Transport cost is reduced as the poultry farm owners have their own vehicles. The merging crops are livestock and egg is the main product. Surplus eggs are to Mongar and Limithang. There are enough buyers. The new crop introduced is yogurt. The demand for agriculture and livestock will increase with Autsho being part of town planning. There are schools and hospitals. Thus, likely change in future demand and price of the product. Pricing is done by the farmers, During COVID time we controlled the price. School pricing is fixed between farmers and schools on a contract. Everyone has access to a bank, telephone and mobile. All women have equal access as men and there are two women entrepreneurs. Agriculture works is mostly done by women and children. Children help during holidays. There is not no conflict and no negative impact on the environment or bio diversity.

### 5.30 Tshenkhar, Lhuentse Gewog

**Discussion points** –Noted. Discussion on project implementation, identify social impact, community participation, identify needs and priorities of beneficiaries of the project area.

The main expectation from the project is to get materials for greenhouses and improve the availability of water for rice cultivation. The project has made it easier to sell the products of the farmers. The main prospects due to the project were the expansion of cash crops/livestock enterprise, and the group's formation has helped in marketing the products efficiently. There was also an increase in the number of businesses and trade after the village introduced the project. The emerging cash crops are onion, broccoli, cauliflower, eggplant, and cabbage. People use their vehicles, or they hire private vehicles for carrying their products to the market. People have access to all the development programs and services in the gewog. There is no gender bias. And the number of women entrepreneurs has increased. More and more



women are starting to engage in agricultural and livestock activities. The Gewog officials and the public are cooperating to implement the project's plans. However, cutting down trees is leading to drying up of water sources. There has been development in the area of farming, like cattle and poultry rearing. The project has helped farmers grow healthier and resilient crops and livestock and even the poor make a decent living (especially the ones in the farm groups). People can afford necessities like cooking stoves, electric bills and other essential items in the gewog and few shops have also opened. The business has increased after the project. The GYT allocated funds, the extension agents trained and gave awareness to the farmers, and the farmers cooperated to implement the project plans successfully.

### **5.31 Gangjur, Mongar Gewog Report**

#### **Discussion Points**

Discussion about project progress, identify any social impacts, review community participation and identify priorities of farmers

The expectations from the CARLEP projects are better irrigation channels, more improved vegetables, and improved livestock breed. The project has helped expand cash crops and increase livestock farming, and the number of farmers has also grown recently. The formation of the Self-help group has made the selling of vegetables easier. There is an increase in business and trade in the gewog. The emerging cash crops are Broccoli, Cauliflower, chilies, poultry, and improved cattle breed and new crops introduced are chilies, pumpkin, passion fruits, and tomatoes. The farmers have to use their private vehicles, and they ask the Gewog office to help them transport their products to the market. The people in the gewog have relatively good access to the government's development programs and services. The men and the women have equal access to loans and related services. The number of women entrepreneurs in agriculture and livestock has always been more than men here, and the number of women entrepreneurs has increased during recent years. There is always good community participation in implementing government projects, and there are no disputes in the gewog. However, the construction of farm roads has affected the flora and fauna of the Gewog. There has been more development in agriculture because of better agricultural techniques and inputs like seeds and greenhouses. The living standard has improved, and we thank CARLEP and all the other projects that support us for making it possible. The houses have better water sources and access to electricity and LPGs, unlike in the past. When the project was first introduced, the people were hesitant. But now, because of all the GYT members' involvement and the villagers' cooperation, the project implementation is going well.

## Annexure 2: Tables on Sampling Details

### First Phase Survey

**Table 1. Households surveyed in Treatment Gewogs**

Dzongkhag	Treatment Gewog	No. of HHs to be covered per Gewog	No. of HHs per Dzongkhag
Lhuentse	Gangzur	37	115
	Menbi	40	
	Tsenkhar	38	
Trashhi Yangtse	Jamkhar	37	114
	Tongshang	37	
	Yangste	40	
	6 Gewogs	229	229

\*3 additional households included in the survey (1 household each in Menbi, Tshenkhar Gewogs of Lhuentse and Yangtse Gewog in Trashhi Yangtse).

**Table 2. Households surveyed in Control Gewogs**

Sl. No	Dzongkhag	Control Gewog	No. of HHs per Dzongkhag
1	Lhuentse	Jarey	75
2	Trashhi Yangtse	Yallang	75
	Total	2 Gewogs	150

**Table 3. Name of villages covered in Control Gewogs**

Dzongkhag	Control Gewog	Name of villages
Lhuentse	Jarey	Changkala, Jarey, Ladrang, Nganey, Waiyang, Yabi/Yabee, Chatrong, Yumchung, Zangkhar, Nabar (10)
Trashhi Yangtse	Yallang	Yallang, Thragom, Phuyang, Rolam, Rinzintanpang (5)
	2 Gewogs	15 villages

**Table 4. List of Key Informants for interviews (Treatment Group))**

Dzongkhag	Numbers of Key Informants		Total
	Female	Male	
Lhuentse	5	9	14
Trashhi Yangtse	4	10	14
	9	19	28

**Second Phase Survey**

Table 5. Households surveyed in Treatment Gewogs

Dzongkhag	Treatment Gewogs	No. of HHs per Gewog	No. of HHs per Dzongkhag
Trashigang	Bidung	38	188
	Khaling	38	
	Radhi	38	
	Shongphug	37	
	Thrimshing	37	
Pema Gatshel	Khar	37	113
	Shumar	37	
	Yurung	39	
Mongar	Chaskar	37	229
	Mongar	40	
	Ngatshang	37	
	Tsakaling	40	
	Chali	38	
	Saling	37	
	14 Gewogs	530	530

\*6 additional households included in the survey. In Mongar, 3 households of Tsakaling and 1 household of Chali Gewogs. And, 1 household from Shumar Gewog from Pema Gatshel and 1 household from Radhi Gewog from Trashigang Dzongkhag.

Table 6. Name of villages covered in Treatment Gewogs

Dzongkhag	Gewog	Name of villages
Trashigang	Bidung	Lemphang, Tsenkhar, Perthong, Dori, Bargon, Kakaniwog (6)
	Khaling	Gomchu, Dawazor, Drawong, Khardung, Dangri, Dangray, Drawang, Bramang, Rashung (9)
	Radhi	Dekiling, Tsenkhar, Jonla, Kadam, Tokshingmang, Pakaling, Tongling (9)
	Shongphug	Changmey, Rangjung, Galing (3)
	Thrimshing	Tshangpo, Thrimshing, Bangzor, Pheperi, Lhakhang Jab, Lamapathang, Dungsingma, Gongsa (8)
Pema Gatshel	Khar	Khar, Shinari, Labar, Tsebar, Khenzo, Phadi, Zordung (7)
	Shumar	Bartserii, Khori Pam (2)
	Yurung	Khangma, Lawang, Thongkar, Yangkhar, Khuminang, Dinang, Dungsingma, Jariminang, Yurung Tsang (9)
Mongar	Chaskar	Ballam, Pam, Yetong (3)
	Mongar	Kilikhar, Yakpogang, Redaza (3)
	Ngatshang	Aring, Bagin, Bachi, Bainangkhar, Bumpazor (5)
	Tsakaling	Ngyentse, Pitsong, Demungla, Drongtey, Tormashong, Sherong, Karshingdar, Deming, Chalagang, Manitsawa, Chubar (10)
	Chali	Sarpo, Lingchung, Ngyelpa, Yagtang, Pangjakpa, Goenpa, Dongju, Shingkar Shong, Chsukiling, Lungkang, Rimchu, Yokhai, Chulabi, Sa Poktar, Lhakhang, Baricola, Charchar may, Gongshing (10)
	Saling (5)	Angdung, Saling, Masangdaza, Thridangbi, Ngantangla (5)
	14 Gewogs	98 villages

Table 7. Households surveyed in Control Gewogs

Dzongkhag	Control Gewogs	No. of HHs per Gewog	No. of HHs per Dzongkhag
Pema Gatshel	Nanong	75	225
	Zobel	75	
	Chongshing	75	
Mongar	Gongdue	75	225
	Silambi	75	
	Jurmey	75	
	<b>6</b>	<b>450</b>	<b>450</b>

Table 8. Name of villages covered in Control Gewogs

Dzongkhag	Gewog	Name of villages
Pema Gatshel	Nanong	Khunadang, Nanong, Sayramkha, Munang, Goskhar, Khaykhar, Tshangri – Pangthang, Drangsung, Gonpa, Lhekperi, Choephel, Ballang, Cheripam, Serimkha, Tsatshi, Muna, Jangri, Yelchen, Kulung, Sayri (20)
	Zobel	Zobel, Mani Gongpa, Pangzor, Ngangmalang, Benangra, Pam, Benangshing, Morkhi, Monglami, Gongpa Singma (10)
	Chongshing	Thongsa, Lanangzor, Mondi, Yomzor, Chongshing (15)
Mongar	Gongdue	Yangbari, Pathang, Bakla, Kormi, Bali, Lapsa, Samlabi, Mithen, Baksa, Bogarbi, Pam, Phuchong Goenpa, Gongdue, Kumadong, Tsanglabi (15)
	Silambi	Kadha, Nagor, Pang, Dak, Salimpong, Tashithang, Krong, Nagor Goenpa, Salambi, Gyelgong, Chawinang, Pam (12)
	Jurmey	Mugtangkhar, Yarangla, Tulukpi, Tshaylam, Korphu, Kongnala, Karmaling, Kutake, Batpula, Dungkar, Wogdang, Dangila, Pangthang (13)
	6 Gewogs	75 villages

Table 9. List of Key Informants for interviews (Treatment Group)

Dzongkhag	Numbers of Key Informants		Total
	Female	Male	
Mongar	7	18	25
Pema Gatshel	2	9	11
Trashigang:	6	11	17
<b>Total</b>	<b>15</b>	<b>37</b>	<b>53</b>

## Annexure 3. Check list and guide for Key Informant Interviews & stakeholder consultations

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### Objectives

The main objectives of the group discussions/consultations are:

- d) To discuss the project with beneficiary communities and seek their views and perceptions;
- e) To identify social impacts and issues;
- f) To review the extent to which community participated in the preparation of past plans and continue to be involved in their implementation;
- g) To find out the current status and issues on women and education
- h) To identify the needs and priorities as perceived by the beneficiaries,

### Guidelines and Procedures

#### 1. General Meeting with Beneficiaries including women and vulnerable groups

##### General Questions

- i) Discuss the project proposal with the community.
- j) Record the perceptions, expectations of the community on food security, income generation, employment
- k) How do the community plan to participate in the planning and implementation of project activities?
- l) What problems (conflicts), constraints or opportunities are foreseen during implementation

#### 2. Economic changes

What are the main prospects (likely economic changes) due to the project?

- Expansion of cash crops (Changes in income sources)
- Increased business and trade
- Easier marketing of farm produce and increased income
- Reduced transport expenses

#### 3. Agriculture/livestock

- What are the main and emerging cash crops
- Productivity trends of food and cash crops once the road is built
- Availability of marketable surpluses
- New crops/products introduced
- Technical support services required
- Any issues

#### 4. Access to markets

- How far is the nearest market?
- How frequently do you go to market and why ?
- Access to outside markets
- Prices and demands
- Transport facilities available (private and public)

#### 5. Other services

- Access to fair price shops and public distribution system
- Access to government's development programs and other services
- Social interaction (number of visits to other villages and cities, participation at social events, by age and gender)

#### 6. Impact on women

- Participation of women in economic activities
- Saving time on agriculture activities
- General health status of women
- Loan sanctioned to women for business purpose

#### 7. Community participation

- Involvement of community in project planning and implementation

#### 8. Any adverse social impacts

- Conflict with outsiders on resources use
- Impact on biodiversity (use of forest products)

**CHECK LIST FOR KEY INFORMANT INTERVIEWS****1 Changes occurring in the agricultural & livestock output and practices**

- a) Have farmers started growing more cash crops or livestock rearing for sale? Provide details – where and by how much?
- b) Are farmers planning to expand agricultural, horticultural, and livestock production?
- c) List new crops/products introduced after the road.
- d) Has there been an improvement in delivery of technical support services on crop/livestock production after the road?
- e) Any new developments taken place due to the project ?

**2 Reducing poverty through employment and economic opportunities**

- a) Describe new opportunities due to the project
- b) What new products have been marketed?
- c) What new income sources are noticed ?>
- d) Has the living standard of poor and vulnerable groups improved?
- e) Any changes in the housing conditions of the poor households ?

**2.1 Opening of new shops and commercial enterprises**

- a) How many new shops have opened up recently?
- b) Has the business and trade increased after the road?
- c) List the new commercial enterprises
- d) Health status of children and pregnant women before and after the project

**3 Beneficiary participation**

- a) How has the project helped to enhance participation by beneficiaries in the project activities?
- b) How do the beneficiaries plan to continue the successful activities of the project
- c) What role did the GYT, community or individuals or other agencies play in the implementation of the project? [GYT for stakeholder mobilization, community mobilization]



**Annexure 4. Annual Outcome Survey Questionnaire CARLEP Eastern Bhutan**

QUESTIONNAIRE ID: _____	
<b>ANNUAL OUTCOME SURVEY 2020</b>	
<b>I</b>	Date (DD/MM/YYYY) :
<b>II</b>	Name of the enumerator: _____

**Note for enumerator:** Before starting the interview, introduce yourself, mention that you are representing CARLEP, under MoAF. Explain the objectives of the survey and state that 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.

Circle codes corresponding to the answers in the right column.

<b>A – HOUSEHOLD INFORMATION</b>		
<b>A.1</b>	Dzongkhag _____ Gewog _____ Village _____	
<b>6</b>		
<b>A.2</b>	A.2.1. House No.: ..... A.2.2. Thram No.....	
<b>A.4</b>	Name of the Respondent:	
<b>A.5</b>	Gender of the Respondent	1. Male      2. Female
<b>A.6</b>	Age of respondent	.....
<b>A.7</b>	Are you the head of the Households	1. Yes      2. No
<b>A.8</b>	if <b>NO</b> , gender of the household head	1. Male      2. Female
<b>A.9</b>	What is the highest level of education attained by the <b>respondent</b> ?	1. Under Graduate 2. Higher secondary School 3. Middle Secondary School 4. Primary Education 5. Non-Formal Education 6. Monastic School 7. Illiterate
<b>A.10</b>	Total area of Dry land a household owns	1. Under cultivation _____ Acres 2. Fallow _____ Acres
<b>A.11</b>	Total area of wet land a household owns	1. Under cultivation _____ Acres 2. fallow _____ Acres

<b>A.12</b>	Did you leased in or lease out the land	1.Yes 2.No
<b>A.13</b>	Area of land Leased out	_____acres
<b>A.14</b>	Area of land leased in	_____acres

<b>B. Household Income and Livelihoods Status</b>		
What is the average income ( <b>Annual</b> )of your household in Ngultrum from the following source?		
<b>B.1</b>	1. Sale of Cereals 2. Sale of Vegetables 3. Cash Crop sales( <i>Ginger, Potato, Cardamometc.</i> ) 4. Livestock ( <i>Dairy products sold only</i> ) 5. Livestock ( <i>Poultry, goat, Piggery, Fishery, etc.</i> ) 6. Fruit crops sold 7. NWFP collected and sold 8. Salaryearned 9. Remittances received 10. Pensionreceived 11. Enterprise (income from <i>Non-agricultural enterprises</i> ) 12. Farm labour /off farm activities wages earned 13. Processed products sold (post-harvest) 14. Other sources ( <i>specify,.</i> )	Nu: _____ Nu: _____ Nu: _____ Nu: _____ Nu: _____ Nu: _____ Nu: _____ Nu: _____ Nu: _____ Nu: _____ Nu: _____ Nu: _____ Nu: _____
<b>B.3</b>	B.3.1. Did your household produce enough food ( <i>cereals, Vegetables and Dairy products, excluding oils and others items</i> ) to feed your family for whole year (2018)?	1. Yes 2. No
	B.3.2. If no, for how many months did <b>Staple Cereals</b> your household produced lasted?	_____Mont hs
	B.3.3. If no, for how many months does your household remain self-sufficient in <b>vegetable</b> ( <i>exclude potato if produced in commercial level</i> )?	_____Mont hs
	B.3.4. If no, for how many months does your household remain self-sufficient in <b>dairy</b> products?	_____Mont hs
<b>B.4</b>	Over the last 12 months (2018), was there any period(s) during which, <b>3 meals a day</b> was difficult for your family? ( <i>food shortage periods</i> )	1. Yes 2. No
	B.4.1. If yes, in which of the twelve months, did your households faced food shortage?	1. Jan 2. Feb 3. March 4. ....
	B.4.2. Was there any improvement as compared to previous year (2018)?	1. Some Improv ement 2. Same 3. Situatio n is worse
<b>B.5</b>	What is your household's average monthly expenditure?	Nu. _____
<b>B.6</b>	List three MAJOR expenditure made by your household in 2018. ( <i>Rank in order.</i> ) 1. _____ 2. _____ 3. _____	

<b>B.7</b>	<b>B.7.1</b> Did you take any loan for agricultural purposes?	1. Yes	2. No
	<b>B.7.2</b> If, <b>YES</b> , Why did you avail loan? ( <i>Multichoice- more than one</i> )		
	<ol style="list-style-type: none"> <li>1. to purchase improved cattle</li> <li>2. to construct cattle shed</li> <li>3. to purchase chaff cutter</li> <li>4. to purchase Milk Can</li> <li>5. to start poultry / piggery/ fishery/ goat farming</li> <li>6. for Mushroom Intensification</li> <li>7. for Greenhouse, meshnet and polytunnels establishment</li> <li>8. for construction of biogas digester</li> <li>9. for vegetables seeds</li> <li>10. for cash crop cultivation</li> <li>11. for orchard development</li> <li>12. for buying farm machineries</li> <li>13. for farm supplies and equipment, eg: seeder, fertilizer spreader, weeder etc</li> </ol>		
	<b>B.7.3</b> Amount of loan availed	Nu. _____ _____	

<b>6.1 C – PARTICIPATION IN PROJECT ACTIVITIES</b>			
<b>C.1</b>	Did you or your family member involved in any activities related to CARLEP in 2018?	1. Yes	2. No
<b>C.2</b>	If yes, in which of the following activities were you (or any member of your household) involved? <i>(Multichoice)</i> <ol style="list-style-type: none"> <li>1. Farmers Training` Vegetable Production</li> <li>2. <i>Vegetable Production Inputs and equipment</i></li> <li>3. <i>Farmers Training` Dairy Management and Animal Husbandry</i></li> <li>4. <i>Dairy production inputs and equipment</i></li> <li>5. <i>Marketing and agri-business (record and bookkeeping...etc.)</i></li> <li>6. <i>Irrigation Canal Renovation</i></li> <li>7. <i>Lead Farmer or Farmer-to-farmer training</i></li> <li>8. <i>SLM and Land Development</i></li> <li>9. <i>Efficient irrigation system</i></li> <li>10. <i>Others</i></li> </ol>		
<b>C.3</b>	In general, how would you rate your satisfaction to any of the project activities that impacted your livelihood.	<ol style="list-style-type: none"> <li>1. Very satisfied</li> <li>2. Moderately satisfied</li> <li>3. Not satisfied at all</li> </ol>	
<b>C.4</b>	Did you or your family member involve in any <b>other project(s)</b> activities (2018)?	1. Yes No	2.

<b>D. Agricultural Production and Irrigation</b>			
<b>D.1</b>	<b>D.1.1</b> Did you receive any training on farm records keeping?	1. Yes No	2.
	<b>D.1.2</b> Do you keep farm records production and income earned?	1. Yes No	2.
	<b>D.1.3</b> If 'No', what is the reasons for not keeping the farm records? ( <i>Multi-choice</i> )		
	<ol style="list-style-type: none"> <li>1. Low literacy rate</li> <li>2. No knowledge on Farm Record Keeping</li> <li>3. Time Consuming</li> <li>4. No awareness on benefits of Farm Record Keeping</li> <li>5. ....</li> <li>6. ....</li> </ol>		
<b>D.2</b>	Production data of following prioritised vegetables		

	Serial	List	Production in 2019()	Amount sold ( )	
	D.2.1	Asparagus (bundle)			
	D.2.2	Broccoli (kg)			
	D.2.3	Cabbage (kg)			
	D.2.4	Carrot (kg)			
	D.2.5	Cauliflower (kg)			
	D.2.6	Chilli (kg)			
	D.2.8	Onion (kg)			
	D.2.9	Radish (kg)			
	D.2.10	Tomato (kg)			
	D.2.11	Others (specify)			
<b>D.3</b>	What is the total area under vegetable cultivation? ( <i>excluding winter vegetables grown in paddy fields</i> )				_____ Acre(s)
<b>D.4</b>	<p>During the past 12 months, what are the <b>agriculture production technologies you or your household adopted?</b> (<i>Multi-choice</i>)</p> <ol style="list-style-type: none"> <li>1. <i>New Vegetable Production techniques</i></li> <li>2. <i>Post-harvest Technologies</i></li> <li>3. <i>Plant Protection</i></li> <li>4. <i>Farm mechanization and Land Development</i></li> <li>5. <i>Soil and Water Management</i></li> <li>6. <i>Green House and Poly-tunnels</i></li> <li>7. <i>Drip Irrigation</i></li> <li>8. <i>Sprinkle Irrigation</i></li> <li>9. <i>Composting (Heap compost or vermicomposting)</i></li> <li>10. <i>Others (Specify)</i></li> </ol>				
<b>D.5</b>	D.5.1. Do you have cattle?				1. Yes      2. No
	D.5.2 If <b>yes</b> , how many numbers improved breed cattle do you have?				Nos. _____
	D.5.3 If <b>yes</b> , how many numbers of local breed cattle do you have?				Nos. _____
	D.5.4 What is the average milk yield ( <i>per cattle</i> ) in winter ( <i>Improved breed</i> )?				_____ltr/ milking cow
	D.5.5 What is the average milk yield ( <i>per cattle</i> ) in summer ( <i>Improved breed</i> )?				_____ltr/ milking cow
	D.5.6 How many litres of milk do you produced in winter?				_____lt rs
	D.5.7. How many litres of milk do you produced in summer?				_____ltrs
<b>D.6</b>	<p>During the past 12 months, did you adopt any new <b>livestock production technologies?</b>(<i>Multi-choice</i>)</p> <ol style="list-style-type: none"> <li>1. <i>Milk Processing and Packaging</i></li> <li>2. <i>Feed conservation (silage making)</i></li> <li>3. <i>Clean Milk production</i></li> <li>4. <i>Bio-gas</i></li> <li>5. <i>Improved fodder grass plantation</i></li> <li>6. <i>Winter Fodder cultivation</i></li> <li>7. <i>Improved Cattle shed</i></li> <li>8. <i>Others (specify)</i></li> </ol>				
<b>D.7</b>	D.7.1. How many acres of improved fodder grass do you grow?				_____ Acre(s)

	D.7.2. How many acres of winter fodder did you grow last winter?	_____ Acre(s)
<b>D.8</b>	D.8.1. What quantity of silage did you prepare in 2018?	_____ Kg(s)
	D.8.2. What quantity of commercial feeds did you purchased in 2018?	_____ Kg(s)
<b>D.9</b>	What kind of cattle shed do you have? 1. Concrete floor and CGI roofing with manger and trough 2. Concrete floor and single roofing without manger and trough 3. Mud Floor with single roofing 4. No cattle shed	
<b>D.10.</b>	<b>D.10.1. Do you use Biogas for cooking?</b>	
	<b>10.2</b> In a day, how many hours do you cook using biogas?	
	<b>D.10.3 If Yes,</b> What were the source of energy for cooking before biogas? 1. firewood 2. electricity 3. LPG gas 4. Kerosene	
	D.10.4 Did the use of other source of energy increased or decreased or remained same after bio-gas installation? 1. Increased 2. Remained Same 3. Decreased	
	<b>D.10.5</b> In your point of view, How would you rate the efficiency of biogas compared to LPG and firewood use? 1. good 2. neutral 3. bad	
	<b>D.10.6.</b> do you face technical problems using biogas? Yes or No  D10.7 If yes, select the appropriate answer below: 1. Lack of skilled operator 2. Poor equipment design 3. Insufficient dung input 4. Labor intensive 5. no problem at all	
<b>Irrigation Infrastructure</b>		
<b>D.11</b>	D.11.1. Do you use <b>irrigation</b> (channels)system(s)?	1. Yes      2. No
	D.11.2. If <b>Yes</b> , did the area under irrigation increased or decreased in 2018, as compared to 2017?	1. Increase 2. Decrease 3. Remained Same
	D.11.3. If <b>Increased or decreased</b> , quantify the area increased/decreased under irrigation.	_____ ac res
	D.11.4. Did the productivity of paddy increase or decrease compared to 2019?	1. Increase 2. Decreased 3. Remained Same
	D.11.5 <b>If decreased</b> , what are the main reasons or challenges faced? 1.	
<b>D.12</b>	D.12. Did you grow vegetable(s) in paddy field after harvest?	1. Yes      2. No
<b>D.13</b>	What types of Irrigation system ( <i>dry land</i> ) do you use for vegetable production? ( <i>Multi-choice</i> ) 1. Drip Irrigation	

	2. Soaker Hoses D 3. Sprinkler System 4. Surface irrigation 5. Rain Water Harvesting 6. Hand Watering 7. No irrigation (depends on rain)
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Use of Agriculture & Livestock inputs in 2020					
D.14	D.14.1 Did you use agriculture & livestock inputs in 2020? If Yes, provide the following information:			1. Yes	2. No
	Input types	Quantity/nos Used	Unit	Total costs	
D. 14.1	Fertilizers		kgs		
D. 14.2	Improved seeds		kgs		
D. 14.3	Improved seedlings		nos		
D. 14.4	Pesticides		Litres/kgs		
D. 14.5	Farm tools/equipment		nos		
D. 14.6	Improved animal breeds		nos		
D.14.6.1	Cattle		nos		
D.14.6.2	poultry		nos		
D.14.6.3	pigs		nos		
D.14.6.7	Pasture seeds		kgs		
D.14.6.8	Fodder plants		nos		

E. Women participation			
E.1	The ownership of following assets of the household is registered with:		
	E.1.1. Land	1. Man	2. Woman 3. Both
	E.1.2. Livestock	1. Man	2. Woman 3. Both
	E.1.3. Cash and savings	1. Man	2. Woman 3. Both
	E.1.4. Farm	1. Man	2. Woman 3. Both
	E.1.5 House	1. Man	2. Woman 3. Both
E.2	E.1.6 Other properties (farm machinery, vehicles,		
	Who mostly operates the following agricultural machineries and equipment?		
	E.2.1. Power tiller	1. Man	2. Woman 3. Both
	E.2.2. Mills	1. Man	2. Woman 3. Both
	E.2.3 Post-harvest machines (Sheller, hullers, oil expellers...etc)	1. Man	2. Woman 3. Both
	E.2.4. Dairy Equipment (milk churners, cream separators...etc..)	1. Man	2. Woman 3. Both
E.3	E.2.5. Chaff cutter	1. Man	2. Woman 3. Both
	Who usually makes decision on the following?		
	E.3.1. Participation in farmers group/cooperative	1. Man	2. Woman
	E.3.2. Participation in training and meetings	1. Man	2. Woman
	E.3.3. On purchase of household assets like land, livestock etc....	1. Man	2. Woman



	E.3.4. On sale of household assets	1. Man 2. Woman
	E.3.5. On use of income earned from sale of agricultural products/assets	1. Man 2. Woman
	E.3.6. Decisions to borrow money/avail loan facilities	1. Man 2. Woman
<b>E.4</b>	Who keep the money earned from the sale of livestock products such as eggs, butter, cheese etc...	1. Man 2. Woman 3. Both
<b>E.5</b>	Who keep the money earned from the sale of vegetables and cash crops such as citrus, mango, cardamom etc...	1. Man 2. Woman 3. Both

<b>F- MARKETS</b>		
<b>F.1</b>	F.1.1. Do you sell <b>Vegetables</b> ?	1. Yes 2. No
	F.1.2. Is the vegetable marketed in group or individually?	1. Group 2. Individually
<b>F.2</b>	Rank <b>TopThree</b> market places for <b>Vegetables</b> as per the quantity of sales from the following list. <i>(Excluding auction of cash crops like potatoes,...)</i>	
	1. School and institutions 2. Middle man or regular contract buyer 3. Local Market within short vicinity 4. Thromde Market within the region 5. Thimphu, Bumthang 6. Local Farm Shops (FCBL) 7. Export to India 8. Others (Specify.....)	Rank 1- _____ Rank 2- _____ Rank 3- _____
<b>F.3</b>	F.3.1. Do you sell <b>Dairy product(s)</b> ?	1. Yes 2. No
	F.3.2. Is the dairy products marketed in group or individually?	1. Group 2. Individually
<b>F.4</b>	Rank <b>TopThree</b> market places for <b>Dairy products</b> as per quantity of sales from the following list.	
	1. School and institutions 2. Middle man or regular contract buyer 3. Local Market within short vicinity 4. Thromde Market within the region 5. Thimphu, Bumthang 6. Local Farm Shops (FCBL) 7. Chenari Dairy Plant 8. Export to India 9. Others (Specify.....)	Rank 1- _____ Rank 2- _____ Rank 3- _____
<b>F.5</b>	F.5.1. Do you or your group have a <b>trader</b> or a <b>person</b> who usually buys in bulk to be sold somewhere?	1. Yes 2. No
	F.5.2. Who does the price fixing?	1. You 2. Middle man 2. Extension Agent
	F.5.3. Has this arrangement improved your access to market?	1. Yes 2. No
<b>F.6</b>	What is the distance from nearest market?	_____ Km(s)

<b>G- HOUSEHOLD EXPENDITURES</b>		
<b>What were your main household expenditures in 2020?</b>		
<b>G1</b>	Do you buy essential items for the household? If Yes, please provide the following information.	1. Yes 2. No
	Items	Amount Nu (annual)
G1.1	Purchase of essential food items	
G1.2	Expenses on fuel for cooking, lighting	
G1.3	Children schooling expenses	
G1.4	Purchase of clothes for the family	
G1.5	Purchase of agricultural inputs	
G1.6	Purchase of livestock inputs	
G1.7	Cost of repair and maintenance of house	

G1.8	Expenditure on hire of labour	
G1.9	Expenses on health	
G1. 10	Expenses on <i>Rimdo</i>	
G1.11	Contributions for welfare	
G1.12	Any other expenses (pl specify )	

<b>H- GENERAL QUESTION</b>		
<b>H1</b>	<b>What were the three major problems faced by your household in 2020 ?</b>	
H1.1		
H1.2		
H1.3		


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THIS IS THE END OF THE INTERVIEW, THANK YOU




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