WORLD BANK (GRANT)

IN THE AMOUNT OF USD 8 MILLION
FOR A

FOOD SECURITY AND AGRICULTURE PRODUCTIVITY PROJECT
DEPARTMENT OF AGRICULTURE
MINISTRY OF AGRICULTURE AND FORESTS
ROYAL GOVERNMENT OF BHUTAN
THIMPHU : BHUTAN

BASELINE SURVEY REPORT




Submitted by:

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ACRONYMS, GLOSSARY AND ABBREVIATIONS

Acronyms

AEOs	Agriculture Extension Officer
BMIS	Bhutan Multiple Indicator Survey
BTN	Bhutanese Ngultrum
CooPs	Cooperative
CGI	Corrugated Galvanised Iron
CSA	Climate Smart Agriculture
DoA	Department of Agriculture
ESMF	Environmental and Social Management Framework
FGs	Farmers Group
FGDs	Focus Group Discussions
FSAPP	Food Security and Agriculture Productivity Project
GAFSP	Global Agriculture and Food Security Program
HDDS	Household Dietary Diversity Score
HSS	Higher Secondary School
IDDS	Individual Dietary Diversity Score
LSS	Lower Secondary School
MoAF	Ministry of Agriculture and Forests
M&E	Monitoring and Evaluation
MSS	Middle Secondary School
NSB	National Statistics Bureau
NWFPs	Non-Wood Forest Products
PDO	Project Development Objective
PNC	Postnatal Care
PMU	Project Management Unit
PS	Primary School
PSU	Primary Sampling Unit
RGoB	Royal Government of Bhutan
RNR	Renewable Natural Resources
SAFANSI	South Asian Food and Nutrition Security Initiative
SSU	Secondary Sampling Unit
ToR	Terms of Reference
TV	Television
WB	World Bank
WFP	World Food Programme
WUA	Water User Association (Irrigation)

Glossary

Chiwog	A cluster of Villages
Chupon	Village messenger
Chuzhing	Wetland
Dzongkhag	District
Gewog	A block in a district (consisting of several villages)
Gup	Elected administrative head of the block
Kamzhing	Dryland
Mangmi	Elected deputy head of the block
Pon	Measurement unit (1 Pon = 80 numbers)
Tshogpa	Chiwog Representative

Abbreviations

Dzkg	Dzongkhag
HHs	Households
Kgs.	Kilograms
MT	Metric Ton
Nos.	Numbers
Nu.	Ngultrum (Bhutanese currency)

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We would like to thank the Food Security and Agriculture Productivity Project (FSAPP) for providing this opportunity to Bhutan Consulting Associates to undertake baseline study on FSAPP key project development impact indicators.

The baseline data, information, analysis, summary and conclusions in this report are derived based on contributions made by various stakeholders: the farmer–beneficiaries from the project area, the Gewog Agriculture Extension officers from FSAPP Gewogs (blocks) and the project officials (for the secondary data). We would like to thank all the contributors for providing valuable time and information for this report.

The information, outputs and analysis in this report and that projected for the Dzongkhags (districts) are purely based on the sample amongst the project targeted 24 Gewogs (blocks) only and not representing the remaining Gewogs of the Dzongkhags. Therefore, the baseline analysis and outputs reflecting the Dzongkhags are purely meant for FSAPP's use only.

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Cover Pictures:

Top Left	Paddy Harvest, Dorithasa village, Gakiling Gewog, Haa
Top Middle	Black Pepper plant at Bhimtar village, Norbugang Gewog, Samtse
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PROJECT RESULTS FRAMEWORK WITH BASELINE DATA

Project Development Objective	Project Outcome Indicators	Baseline	Sources of Data for baseline	Target
To increase agricultural productivity and enhance access to markets for farmers in selected Gewogs in south-west Bhutan	1. Productivity of targeted crops increased by at least 20 percent in project areas. 1.1 Paddy 1.2 Potato 1.3 Chilli 1.4 Cauliflower 1.5 Cabbage 1.6 Beans 1.7 Tomato 1.8 Onion 1.9 Broccoli 1.10 Carrot 1.11 Pea 1.12 Green Leafy Vegetables 1.13 Ginger 1.14 Black Pepper 1.15 Quinoa 1.16 Citrus 1.17 Large Cardamom	**Kg/acre** 1.1) 1021[1] 1.2) 2934 1.3) 1545 1.4) 1676 1.5) 2359 1.6) 1273 1.7) 1349 1.8) 1286 1.9) 1009 1.10) 1766 1.11) 1010 1.12) 1797 1.13) 2100 1.14) Can't assess 1.15) 224 1.16) 3293 1.17) 145	Focus Group Discussion with Farmers	20%
	2. Increase in both volume and value of produce marketed by at least 20 percent. 2.1 Volume of produce marketed 2.2 Value of produce marketed	For project targeted crops only 2.1) 3392.89 tons 2.2) 302.74 million (Nu.)	Household survey	20%

[1] The productivity of Paddy (1021 kg/acre) is average from all 24 Gewogs, wherein low yielding areas were also included. The average productivity of Paddy at baseline from areas to be supported with four irrigation schemes by the project stands at 1244.75 kg/acre as 273.16 acres out of total command area of 1346 has flood irrigation at present (details on productivity in areas under each irrigation scheme is provided in section 4.4.2 in the report).

	3. Number of direct project beneficiaries of which 30 percent are women.	8023 HHs (total population 31290) – 9387 females[2]	Statistical Unit, PPD, MoAF and Population and Housing Census of Bhutan, 2017	10,400 HHs – 15,600– female beneficiaries
Intermediate Results Indicators				
Component Objective	**Project Outcome Indicators**	**Baseline**	**Source of data for baseline**	**Target**
To strengthen farmers' groups (including in nutrition), so they are better able to implement and sustain project interventions.	1.1 Number of beneficiaries receiving technical trainings and other capacity building support	31 farmers groups	Agriculture Extension Officers	300 farmers groups
	1.2 Number of farmers who are members of an association including producer groups, cooperatives etc. (disaggregated by gender) – GAFSP Core Indicator # 14	3053 farmers[3]	Agriculture Extension Officers	10,400 farmers
	1.3 Number of people receiving improved nutrition services and products through the project - GAFSP Core Indicator # 11 (new GAFSP indicators) 1.3.1 Number of people who received nutrition counselling/education, recipients of Ready-to-use-Therapeutic Foods, bio-fortified foods, Vitamin A and micronutrient supplements 1.3.2 Number of people receiving extension support for nutrition-relevant techniques	5710 numbers[4]	Household survey	6,000 numbers
To improve agricultural productivity vital for improving food	2.1 Targeted crop area provided with irrigation – GAFSP Core Indicator # 6 2.1.1)Area covered by Flood Irrigation 2.1.2) Area covered by Micro irrigation	2.1.1) 273.16 acres[5] 2.1.2) 29 acres	Agriculture Extension Officers	1,346 acres 250 acres

[2] A list of 8023 households for 24 project Gewogs, as available with Statistical Unit, Policy and Planning Division, Ministry of Agriculture and Forests was used as sample population for the baseline survey. The list however, does not have population details segregated by the gender. To arrive at number of beneficiaries segregated by gender, national average household size of 3.9 was applied as per Population and Housing Census of Bhutan, 2017 (National Statistics Bureau, Royal Government of Bhutan). Therefore population = 8023 x 3.9 = 31290 (30% of 31290 are 9387 females). The projected target in the logframe was estimated using similar method but with HH size of 5 persons (as per ProDoc) and 30% of total population as targeted female beneficiaries.

[3] 3053 are actual numbers of farmers as members of farmers groups or cooperatives till Dec 2017 (but not those having received any project support). The target is 1 person per HHs (10,400) are supported by the project in creating or strengthening farmers group.

[4] 77.4% i.e. 6210 numbers out of 8023 have received nutritional counselling; 42.5% (3410 numbers) regularly consume ready-to-made therapeutic foods; and 93.6% (7510 numbers) received nutrition relevant techniques and supports. Average of three is 5710 numbers. The target of 6,000 is inclusive of both indicators (1.3.1 and 1.3.2).

[5] The acreage reflected is existing scenario as of March 2019, covered by flood irrigation for four irrigation schemes to be supported by the project. The coverage of 29 acres by micro-irrigation is assured micro-irrigation for water user associations for the entire project area (total from 24 Gewogs).

security and nutrition.	2.2 Number of water users with new/improved irrigation services – GAFSP Core Indicator # 8	4376 persons[6]	Agriculture Extension Officers	4,065 persons
	2.3 Number of farmers who have adopted an improved agricultural technology promoted by the project in targeted project areas (gender disaggregated) – GAFSP Core Indicator # 4	91 % (7301 numbers out of 8023)	Household survey	10,400 numbers
	2.4 Total land area under cultivation for citrus and cardamom increased by 5percent	Citrus 1140.30 acres and Cardamom 3744.63 acres	Household survey	5%
To promote nutrition sensitive value chain development for high value (economically and nutrient-rich) crops in order to enhance market linkages for farmers.	3.1 Number of beneficiaries of project supported market infrastructure	11 groups[7]	Agriculture Extension Officers	30 Groups
	3.2 Number of producer groups receiving market information	19 numbers[8]	Agriculture Extension Officers	30 numbers
	3.3 Number of farmer groups linked to schools	0	FSAPP M&E Data	10 numbers
	3.4 Number of children receiving the recommended 5 servings of fruits/vegetables per day	703 numbers [9]	School survey	2,100 numbers
	4.1 At least 2 Learning Notes and 3 Case studies published and disseminated	n/a		2 Learning Notes 3 Case Studies
	4.2 Progress reports are prepared and submitted on biannual basis and are of satisfactory quality.	n/a		Accurate and timely reports
	4.3 Procurement of goods and works under this project is completed according to schedule.	n/a		Contracts awarded and completed on schedule.
	4.4 Percentage of beneficiaries satisfied with services provided by the project.	n/a		50

[6] 35 irrigation user groups indicated having assured irrigation facilities with 1122 HHs as members. Applying national average household size of 3.9 (as per Population and Housing Census of Bhutan, 2017), 4376 persons are benefitting water users but not from project supported irrigation interventions (i.e. 3.9X1122=4376). The target was estimated in similar method with household size of 5 and 813 HHs benefitting from project supported irrigation interventions.

[7] As of Dec 2017, 11 farmers groups have access to some form of market infrastructures but not the project supported market infrastructures. The target of 30 states that at least one forms of market infrastructure is supported for 30 groups.

[8] As of Dec 2017, 19 farmers groups have received some market information but not from project interventions.

[9] School children receiving 5 or more than 5 servings of fruits and vegetable per day as per 24 hours recall period and considering one serving ~ 125 grams.

EXECUTIVE SUMMARY

Background

The Food Security and Agriculture Productivity Project (FSAPP) with a grant from World Bank to the Royal Government of Bhutan (RGoB) focuses to reduce rural poverty and malnutrition through climate smart agricultural productivity enhancement for food and nutrition security programme and aims to benefit 8023 households. The five year project (with closure by December 2022) is implemented by Department of Agriculture, under Ministry of Agriculture and Forests; covering 24 Gewogs (blocks) under five Dzongkhags (districts) in Bhutan: Chhukha, Samtse, Dagana, Haa and Sarpang. The project has four components: a) Strengthening Farmers and Producer Groups; b) Enhancing Farmers Productivity; c) Enhancing Access to Markets; and d) Project management. The project development objective (PDO) is to increase agricultural productivity and enhance access to markets for selected Gewogs. Total project costs are estimated at US$ 9.35 million. Funding sources include the Global Agriculture and Food Security Program Trust Fund (GAFSP) grant of US$8 million; contributions from the RGoB in the form of staff salaries and operating expenses (US$ 1.12 million), and beneficiaries participating in cost-sharing arrangements for the provision of equipment and materials, including labour (US$ 0.23 million).

The objective of undertaking baseline study is: to establish benchmarks of project results framework and various components including on environment and social safeguards and on gender issues prior to the actual implementation of the activities, which will be used as the basis for comparison and monitoring of the project activities. Using one-stage cluster sampling (primary sampling units were Gewogs; and secondary sampling units were households) from all 24 Gewogs, 2469 households (HHs) out of total 8023 (30.77%) were interviewed as against initial sampling target of 30% (2432 HHs). Additionally 401 numbers of day scholar students from 10 sampled schools out of total 16 were interviewed, and data related to boarding students from these 10 schools were collected from mess supply side (a group of students and mess in-charge). Further, focus group discussion with 878 farmers and discussion with 22 Gewog agriculture officers were also undertaken.

The methodology adopted were: review of the indicators; design of field work and sampling; developing survey questionnaires; undertaking field work; data analysis; generation of outputs and report writing. As data collection methods, household survey; school student's and mess in-charge survey; focus group discussion with farmers; discussion with Gewog agriculture officers; e-questionnaires to Gewog agriculture officers; and secondary data from few published reports were used. The baseline data is for the year 2017.

Findings

The distribution of respondents (2469 famers) was 57.9% males and 42.1% females, out of which 65.7% were male-headed HHs and 34.3% female-headed. Likewise, out of 401 day scholar students, 49.9% were females and 50.1% males. In all 9.5% reported being single mother headed HHs. From 16 project targeted schools, 4287 numbers are boarding students and 4084 are day scholars (total 8371). Using national average household size of 3.9 for the year 2017, for 8023 HHs, the estimated beneficiaries are 31290 (with 30% as expected female beneficiaries i.e. 9387) as against the project target of 10,400 HHs and 15,600 expected female beneficiaries.

Cell phones; rice/curry cookers; TV/Radio/DVD; and LPG cylinder with stove are owned by more than 50% of the HHs. Very few HHs have agricultural equipments and machineries. As high as 32.1% (2574 HHs from entire project area) have houses with concrete wall and corrugated galvanised iron (CGI) roof, and 12.6% (1010HHs) still have thatched/bamboo wall houses. A highest of 39.9% (3210HHs) has flush type outside their houses.

The main income source is agriculture to 87.8% (i.e. 5286 HHs) followed by livestock for 40.5% HHs; off farm activities (35.2%); and remittances including pension and salary for 27.4% HHs. About 60% of the HHs falls in annual income ranges between Nu. 5000 to Nu. 100,000 and 18.31% have it between Nu. 100,000 to Nu. 200,000. For higher percentage of

HHs (29.7%) the main income earner remains to be solely father of the household; by the parents for 21.9% HHs; and solely by mother of the households for 10.1% HHs.

Out of 24 FSAPP Gewogs, 20 Gewogs in total have 98 numbers of Farmers Groups and Cooperatives, with membership strength of 3053 farmers (68.8% males: 32.2% females). The remaining 4 Gewogs reported not having any groups till December 2017. Within 248 elected positions in farmers groups (as office bearers), 81% are males and 19% are females. Twenty five out of 98 groups have availed technical trainings; 4 on electric fencing maintenance; 2 on managerial aspects; and 67 groups have not received any training. Thirty five irrigation water user groups (with membership of 1122 HHs) have assured irrigation facilities (1842.1 acres under assured flood and 29 acres under micro-irrigation). Considering national average household size of 3.9 persons, in total 4376 persons have assured irrigation facilities.

Based on the farmers reporting having produced project targeted crops in the year 2017, it was found that out of 2469 households interviewed, 47.2% produced Paddy (i.e. 3789 HHs out of total 8023 HHs); 46.5% (3730 HHs) produced Potato, 60.7% (4871 HHs) produced Chilli; Cauliflower (27.4%; 2200 HHs); Cabbage (33.5%; 2684 HHs); Beans (55.4%; 4449 HHs); Tomato (20.3%; 1631 HHs); Onion (12.3%; 985 HHs); Broccoli (18.7%; 1501 HHs); Carrot (15.3%; 1228 HHs); Pea (10.1%; 809 HHs); Green leafy vegetables (68.2%; 5472 HHs); Ginger (30.5%; 2450 HHs); Black pepper (0.5%; 39 HHs); Quinoa (1.5%; 117 HHs); Citrus (6.8%; 549 HHs) and Large Cardamom (42 %; 3373 HHs). The productivity (Kg/acre) of various project targeted crops stands at: Paddy (1021), potato (2934); chilli (1545); cauliflower (1676); cabbage (2359); citrus (3293); cardamom (145) amongst the prominently grown crops. The total area under Citrus cultivation is estimated as 1140.30 acres and that under Cardamom is 3744.63 acres. The total command area for Chuzhing (wetland) under four irrigation schemes supported by the project (under construction) is 964.25 acres and an average productivity of Paddy in these areas is 1244.75 Kg/acre as 273.16 acres is already under flood irrigation. The earlier reflected productivity of Paddy (1021 Kg/acre) is average from all 24 Gewogs that includes low yielding areas as well. Amongst higher quantities, the average annual marketed volume is: rice 130,367.24 kgs; potato 1353,444.91 Kgs; ginger 390,916.48 Kgs; citrus 103,925.90 Pons; and cardamom 321,745.86. Summing up the revenue generated to farmers by marketing all project targeted crops[10], in total Nu. 302.74 million has been generated.

In all, 70.3% of the Chuzhing (wetland) owned is cultivated; 24.9% were left fallow and 4.8% were leased out. In case of Kamzhing (dryland), 79.7% is cultivated; 19.3% is left fallow and 0.9% was leased out. With regards to accessibility to inputs as and when required, 92%, i.e. 7350 HHs reported having accessibility to improved seeds and seedlings; 32.9% for improved packaging materials; 27.5% for easy access to credits; 25.6% to power tillers; 24.3% to fertilizers; 21% to sprayers; and 13.9% to agro processing. In terms of accessibility to irrigation facilities, 61.9%, i.e. 4968 HHs out of total 8023 are dependent on drinking tap water; 39% (3125 HHs) are using surface irrigation; 36.5% HHs are rain water dependent; 13.6% are using water from storage tanks; and 10.3% are using small pipes along with sprinklers. In total 7777.9 acres is under assured flood irrigation and another 1569.2 acres is under assured micro-irrigation facilities.

With regards to improved technologies adopted, 67.2% (5388 HHs) undertake crop rotation practice; 62.4% (5007 HHs) use improved seeds and seedlings; 61.7% (4949 HHs) undertake contour farming; and 55.5% (4452 HHs) undertake intercropping amongst the prominent ones. The baseline for technologies such as stone pickers, paddy cutters and drum seeders will remain to be zero as such technologies were not introduced before and its introduced first time in Bhutan by the project

[10] Paddy. Potato, Vegetables (chili, cauliflower, cabbage, beans, tomato, onion, broccoli, carrot, pea, green leafy vegetables) Large Cardamom, Citrus, Quinoa and spices (Ginger & Black pepper)

Eleven out of 42 production and marketing related farmers groups reported accessibility to marketing infrastructures (mainly available Sunday markets, small market sheds or towns and to auction yards). Nineteen groups have some access to current market prices. Amongst the respondents, 67.2% (5391 HHs) have access to current market prices; 46.8% knows the trends in market prices; 43.1% have knowledge of available markets; but less percentage have information on cost of accessing markets, and on ease of market information. Peer farmers is most prevalent source of market information (for 56.7%, i.e. 4549 HHs); followed by information from traders / middlemen (40.7% HHs); radio / TV for 23.4 %; social media for 15.9%; and least mentioned are the extension officials, interactive voice response, Department of Agriculture Marketing and Cooperatives (DAMC) website, and newspapers. Till December 2017, none of the farmers groups were linked to school feeding program.

There were not a single HHs reporting absolute hunger or food insufficiency, considering food lasts for 12 months consumption (produced and purchased). In all, 51.9% HHs do not produce surplus of major food commodities. Those that produce surplus are: fruits and nut by 22.6% HHs; vegetables by 16.8%; rice by 8.8%; maize by 8.4%; and potato by 7.9% HHs. As staple food, 64.4% (5170 HHs) are not producing enough Paddy from own farm to last for 12 months consumption. Other food shortages from own farm are Vegetables for 56.9% HHs; Potato for 56.7% HHs; Fruits and Nuts for 56.1% HHs; and Maize for 53.8% HHs reflecting household's food insecurity. There is no significant difference between male and female headed households, as the percentages of HHs for each of the commodity in shortage from own farm are almost the same for both female headed and male headed HHs.

National Nutrition Survey (2015) observed the percentage of households suffering food insecurity, including food shortages is extremely low and is found to occur only in households in exceptional circumstances (2% of households). In the five FSAPP Dzongkhags, Haa had the lowest percentage of children (9.8%) who were moderately or severely underweight while Chhukha had the highest (14.1%). The percentage of moderately or severely stunted children ranged from 23.2% (Sarpang) to 30.6% (Haa). The percentage of moderately or severely wasted children ranged from 3.3% (Haa) to 10.9% (Chhukha).

In overall, about 44% of the households have a medium dietary diversity, while 27.2% and 28.9% of the households have low and high food diversity respectively. The mean household dietary diversity (HDDS) stood at 7.6 and there is no difference in dietary diversity between male-headed and female-headed households. On an average, students consume 8 food groups with mean individual dietary diversity score (IDDS) of 8 for males and 7.8 for females. For HDDS 12 food groups were used for three thresholds: 1) Low dietary diversity; 2) Medium dietary diversity; and 3) High dietary diversity. For students, 14 food groups were used to arrive at mean IDDS.

About 45.6% of the boarding schools reported three servings of the fruits and vegetables in a day, followed by four (40%), and five servings (13.4%). Amongst the day scholar students, 46.6% reported three servings of fruits and vegetables in a day, followed by two (20.7%), four (20.3%) and five or more servings by 6.8% of the students. From a total of 6679 students from 10 surveyed schools (3757 boarding and 2922 day scholars), it is estimated that 703 students (10.5% out of total 6679 students) were receiving 5 or more servings of fruits / vegetables in a day with 24 hours recall period. One serving is equivalent to one small cup of approximately 125 grams.

About 77.4% HHs have received nutritional counselling or education advising on appropriate food and vitamin A and micro-nutrients supplement intake and main source of such counselling were health officials from the Gewogs. About 70% of the mess in-charges / cooks and 90% of the boarding students have received nutritional counselling in the past one year. The main sources of counselling were: school health counsellor (for 60% students); parents / family members (40%); personals from school agriculture program and health personals (30% each); and media (20%). For day scholar students, 83.5% received such counselling in the past one year. More females (88.9%) have received the counselling than their male (78.1%) counterparts. A slightly over half (51.6%) received from school health coordinator; followed by parents'/family members (34.2%); school counsellors (28.6%); media (10.7%); and health personals from Gewogs (9.9%). For majority of the farmers and students, they

received the nutritional counselling/education on an irregular basis without appropriate time interval.

Majority (93.6%) HHs mentioned that they received one or other of nutritional techniques such as hand washing (mostly by 24.6%), safe storage of food (16.7%), awareness on food diversity (15.8%), general knowledge in nutrition and behaviour (8.8%), food diversity (15%) and dietary habits (12.8%). While all the boarding students including mess in-charges and cooks have received hand washing skills (as nutritional relevant techniques and awareness) good percentage of mess in-charges (ranging from 60% to 80%) and boarding students (from 20 to 60%) also received techniques / awareness on the same. Likewise, all day scholar students received hand washing technique / awareness; followed by safe storage of food items (71.4%); awareness of food safety (41.5%); general knowledge in nutrition (23.3%); and food diversity (13.7%).

As high as 57.5% HHs reported regularly consuming ready-to-made therapeutics food in the households. It was found that boarding students were not served with ready-to-made therapeutic foods, micro-nutrients and vitamin a supplement. However, students are regularly provided with vitamin A and de-worming tablets. In case of day scholar students, more than half (54.1%) of the students have not consumed any ready to made therapeutic foods, micro-nutrients and vitamin A supplements. The proportion of students consuming such supplements (45.9% in total) was higher among females (51.4%) than males (40.4%).

A separate study on Nutritional Availability, Awareness and Practices Survey for capacity development and communication for improved nutrition outcomes in rural households' for SAFANSI project by Tarayana Foundation, conducted in October 2018, in one Chiwog (Thongsa-Tobchenthang) under Tading Gewog in Samtse Dzongkhag found that the main drivers of change is cash income in all aspects of livelihood, health and education; the food production is very limited both in terms of varieties that the households grow and the production; the majority of the respondents had adequate knowledge on nutrition; water supply, hand washing and use of toilets are common among majority of the households; knowledge on mothers' health during pregnancy is limited; majority of the respondents do not take nutrition supplements; pregnant women and mothers of young children are fully aware of the child feeding practices and follow the practices.

As high as 39% (3129 HHs) mentioned that they have not availed any of the agriculture related trainings / awareness / demonstrations in recent past till December 2017. From those availing trainings, 22.4% indicated mostly females and 24.3% indicated mostly males as usually participating member from the household. Likewise, for 51.8% (4156 HHs) farm works are undertaken equally by males and females in the households. For decision making, for 49.5% (3971 HHs) it's mostly by the male as head of the family, for 23.1% (1853 HHs) it's mostly by females as head of the family, and for 22.6% (1813 HHs) its jointly by all the adult members in the households.

Majority of the households (65.9%, i.e. 5287 HHs) felt that there is no increased workload for females in the households though 11.8% (947 HHs) remained neutral stating they "don't know", another 22.3% (1789 HHs) felt there is increased workload. For 69.3% out of those expressing increased workload, it was due to more men being engaged in off-farm activities; for 50.4% it was due to social factor wherein females are required to stay back in rural households to take care of children and parents; 18.5% mentioned as male rural-urban migration; 13.8% felt men migrate out owing to higher wages as compared to females; and for 8.4% mentioned males need to migrate out to earn owing to food insufficiency in the households.

With less exposure, it was observed that recommending specific crops and relating it to its actual benefits were very difficult, for the women farmers to express. Despite some of the crops that were of interest to them were: Lentils, split pulses, Chickpea (channa), Hazelnuts, Avocado, Mushroom, Asparagus, Agar trees, Arecanut, Coffee, and Turmeric.
Majority of the households indicated crop damages by wild animals as most common challenge in agriculture (76.8% HHs); followed by pests, diseases and weeds for 70.4% HHs; lack of irrigation facilities for 54.9% HHs; inadequate labour in the households for 43% HHs;

inadequate availability of inputs for 41% HHs; and unavailability of market for the produce as indicated by 37.3% HHs amongst the prominent ones.

Conclusion

- Though majority of the households in the project area have good houses (with concrete walls), flush toilet and good numbers of household's assets, in general HHs own very less agricultural equipments and machineries. Despite households having accessibility to certain inputs such as for sprayers, fertilizers, power tillers, agro-processing mills, most households have poor accessibility to transplanters, threshers, dryers and graders amongst others.
- Rural households are mostly dependent on agriculture (about 88% HHs) for their cash income, followed by income from livestock but at the same about 60% of the HHs having annual cash income from all sources between Nu. 5,000 to Nu.100,000 reflects that in overall cash income to the households are comparatively low in terms of their needs for necessary expenditure.
- About 70% of Chuzhing and about 78% of Kamzhing being cultivated by the rural households reflects significance of households' dependency on agriculture in the project area. However, it is also to be considered that all Chuzhing is not necessarily cultivated with Paddy but with other crops such as Cardamom, Ginger, potato and even vegetables.
- In general, majority of the households (67.2%) have reach to current market prices amongst the other market information but less than 50% have reach to information on trends in prices and knowledge about available markets, and it is mostly communicated through peer farmers and traders. However, HHs have poor access to marketing infrastructures in view of not having temporary or permanent market sheds, collection or packaging centres, and storage facilities.
- Though all HHs have food sufficiency (including those purchased), as staple food, 64.4% HHs not producing enough Paddy from own farm for 12 months household consumption reflects that food security situation from own farm is fragile.
- About 44% of the households having a medium dietary diversity, and 27.2% and 28.9% of the households having low and high food diversity respectively reflects low household dietary diversity for farmers as compared to students having high dietary diversity with mean individual dietary diversity score of 8 for males and 7.8 for females.
- For majority of the households, participation in agricultural trainings / awareness and that for undertaking farm works are done equally by males and females but for decision making, as compared to females, its more HHs that depend on males as the head of the family.
- The households are challenged with several agricultural constraints and have expressed strong need to have appropriate technologies and measures to curb these challenges such as wild animals destroying crops; pests, diseases and weeds; inadequate irrigation facility and water; inadequate inputs; and unavailability of marketing infrastructures and markets.

1. INTRODUCTION

The Royal Government of Bhutan (RGoB) through the Department of Agriculture (DoA), Ministry of Agriculture and Forests (MoAF) has availed World Bank (WB) grant support of for a Food Security and Agricultural Productivity Project (FSAPP). The five year project with closure by December 2022, is to reduce rural poverty and malnutrition through the climate smart agricultural productivity enhancement for food and nutrition security programme. The project is targeted to cover twenty four Gewogs (blocks) under five Dzongkhags (Districts) of Chhukha, Dagana, Haa, Samtse and Sarpang.

The project has four components: a) Strengthening Farmers and Producer Groups; b) Enhancing Farmers Productivity; c) Enhancing Access to Markets; and d) Project Management. The project aims to directly benefit approximately 8023 households. The project also aims to improve home grown school feeding programs for 3,000 school children in 17 schools located in 11 project Gewogs by facilitating productive linkages among producer groups and the schools.

The project is in line with the Royal Government of Bhutan's (RGoB) efforts to reduce rural poverty, food insecurity and malnutrition. It also aims to increase resilience to climate change through climate smart agriculture (CSA) practices for enhancing food security and nutrition and increased access to local and export markets for producers.

The project focuses on:

a) The farmer as the primary beneficiary and lead actor in food security, nutrition and agricultural commercialization.
b) Increasing the productivity of food crops (rice, potato and quinoa) and high value crops (large cardamom, ginger, spices, vegetables and citrus).
c) Linking farmers to agri-markets through a value chain approach.

The project development objective (PDO) is to increase agricultural productivity and enhance access to markets for selected Gewogs and PDO will be measured by the following indicators: a) an increase in the productivity of targeted crops (Rice, Potato, Quinoa, Citrus, Vegetables, Large cardamom, Spices) by at least 20 percent in project areas, b) an increase in both the volume and value of produce marketed by at least 20 percent, and c) the number of direct project beneficiaries, of whom approximately 30 percent are women.

Bhutan Consulting Associates was awarded the assignment to undertake "Baseline Study for Food Security and Agriculture Productivity Project' and the objective of the study is:

"to establish benchmarks of project results framework and various components including on environment and social safeguards and on gender issues prior to the actual implementation of the activities, which will be used as the basis for comparison and monitoring of the project activities."

2. PROJECT BACKGROUND

The project has four components as follows:

Component 1: Strengthening Farmer and Producer Groups

The objective of this component is *to strengthen farmers' and producers' groups so they are better able to implement and sustain project interventions.* It aims to improve agricultural productivity and socio-economic conditions of farmers by supporting weak farmers' groups that lack necessary and relevant skills, knowledge, practices, quality inputs, and appropriate technologies. The main areas of interventions for component 1

are: 1) Farmers Groups Strengthening and Formation; 2) Strengthening Producer Groups; and 3) Contribution to Improved Nutrition.

Component 2: Enhancing Farmer Productivity

The objective of this component *is to improve agricultural productivity vital for improving food security and nutrition.* The component will promote climate smart agriculture through: (a) productivity enhancement of rice, vegetables, pulses, and potatoes for improved food security and nutrition, and (b) productivity enhancement of key high value crops such as spices (specifically large cardamom and ginger), vegetables, and citrus for local and export markets. Overall, the purpose is to expand cultivated areas, increase climate smart cropping intensity, and increase productivity and production for potential commercial surplus. The areas of interventions are: 1) Improving Water Use Efficiency; 2) Providing Improved Farm Management and Technical Capacity Building; and 3) Enhancing Agricultural Inputs and Technologies.

Component 3: Enhancing Access to Markets

This component aims *to promote value chains for selected high value nutrient-rich crops and to enhance linkages to domestic and export markets.* The primary focus is to: (a) reduce post-harvest losses, (b) strengthen nutrition sensitive value chains of select crops, and (c) enhance producers' knowledge, bargaining power, and access to agri-markets. Activities under this component will include strengthening local producer-consumer linkages and establishing productive relationships with public and private market players, school meal programs, and exporters. The sub-components are: 1) Support to Post Harvest and Market Infrastructures; and 2) Linkage to Domestic and International Markets.

Component 4: Project Management

This is to support all aspects of project management including: (a) management and coordination, (b) monitoring and evaluation, (c) technical assistance, and (d) grievance redress system. The main functions and activities are: (a) provide overall governance and direction to the project; (b) provide strategic, management, and operational guidance and support to project staff for achieving the PDO and expected outputs; (c) regularly monitor and analyze the overall and component specific quality and pace of implementation, environmental and social management framework (ESMF) compliance, budget and expenditures, and address any issues, bottlenecks, and gaps to ensure that progress in project implementation is on track; (d) conduct a capacity needs assessment of project staff and provide requisite knowledge, management skills, exposure visits, and specific thematic/technical training in a systematic manner; (e) establish a robust monitoring and evaluation (M&E) and reporting system, including baseline surveys, mid-term assessment, and end of project evaluation; (f) establish a clear and effective mechanism for grievance redress; (g) strengthen project communication and knowledge management and (h) support reviews, studies, and policy analysis that would contribute to the country's agriculture, food security, and nutrition policies and plans.

Project Costs and Financing

Total project costs are estimated at US$ 9.35 million. Funding sources include the Global Agriculture and Food Security Program Trust Fund (GAFSP) grant of US$8 million; contributions from the RGoB in the form of staff salaries and operating expenses (US$ 1.12 million), and beneficiaries participating in cost-sharing arrangements for the provision of equipment and materials, including labour (US$ 0.23 million). In relative terms, the GAFSP grant would finance 85.5 percent, RGoB 12 percent, and beneficiaries, 2.5 percent of the total project costs.

3. DESCRIPTION OF METHODOLOGY AND SAMPLING

3.1 Methodology

To undertake baseline study in accordance to the objectives, five different stepwise phases of study were undertaken as follows:

1. Desk work and design of survey (including tools)
2. Planning phase
3. Field research (survey and Consultations)
4. Data analysis & report writing
5. Submission and finalisation of report

3.2 Sampling and Sample Covered

The study being cross sectoral, the target populations were the farmer's households and students (in schools). A one-stage cluster sampling procedure was adopted for the selection of households. The Gewogs were considered as *clusters*. The Primary Sampling Unit (PSU) was the Gewog and the Secondary Sampling Unit (SSU) was the household. The selection of households within each of the 24 Gewogs was done using probability sampling: simple random sampling without replacement (SRSWOR) but only for those households residing and cultivating land. Using the list of households for the 24 project Gewogs provided by the statistical unit, Policy and Planning Division, Ministry of Agriculture, 8023 households were taken as population for sampling.

Sample sizes for household were obtained using the following sample size calculation formula.

$n_o = z^2\, p\, (1-p) f / e^2$

Where,

n_o = sample size (when target population size is infinite)

z = statistic that defines the level of confidence desired (1.645 for 90% confidence level)

p = an estimate of a key indicator to be measured by the survey (assumed to be 0.7)

f = the sample design effect, deff is 1

e = precision level, +- 5%

Plugging the figures in the formula, it yields

$n_o = [1.96^2 \times (0.7 \times 0.3)] \times 1 / 0.05^2$

$= 159$

However, a population correction factor (FPC) and non-response rate (of 3%) should be taken into consideration because the target population size is 'finite'. The formula to factor FPC is given by:

$n = [(n_o N)/\{n_o + (N-1)\}]$

The total sample size determined was 2407 households which are 30% of the total households (8023). In total, sample covered during survey (in the month of Oct and Nov 2018) from all 24 project Gewogs were 2469 households (which is 30.77% of 8023 households), the details of which by the Dzongkhags and the Gewogs and by the gender of the respondents are presented in subsequent section.

For sampling of day scholar students, out of total 16 schools with total students of 4084 (from Annual Education Statistics, 2017) and as per ToR, only 10 schools were randomly selected by the strata of schools (to have representation of different level of schools - primary school, lower secondary school, higher secondary school and central schools). Compared to other levels, primary schools were more and therefore only 3 out of 8 were selected. A certain numbers of students were selected using probability sampling. The schools were considered as clusters.

Using the total population of day scholars for 10 selected schools (2971 numbers) and using the same formula as for household sampling but with deff of 1, the sample size obtained for day scholar students is:

$n_o = [1.96^2 \times (0.5 \times 0.5)] \times 1/ 0.05^2$

$=384$

Considering population correction factor (FPC), the sample size is obtained to be 348 students. The number of students (day scholars) is determined based on proportional allocation. In actual survey, 401 day scholar students from 10 different schools were interviewed, the distribution of which by school and gender of the day scholar students is provided in subsequent section. In sampling, 2 central schools, 2 higher secondary schools, 1 middle secondary school, 2 lower secondary schools and 3 primary schools were selected, presented in subsequent section as table 3. However, during survey in Oct – Nov 2018, it was found that two of the schools were upgraded to central schools (i.e. Drujeygang HHS; and Lhamoizingkha MSS).

For the boarding students from these 10 schools, the data were collected from the supply side as the meals served remain same for all boarding student. A group of six boarding students from each school were asked questions related to dietary diversity and on other nutritional aspects and the data provided by these boarding students were validated by school mess or relevant person. Instead of sampling all boarding students, this method was applied as already mentioned data related to dietary diversity and servings per day based on meals served with recall for last 24 remains the same for all boarding students; and questions related to nutritional counselling and ready-to-made therapeutic food intake also remains same for all boarding students.

3.2 Survey Tools and Data Sources

For much of the baseline information that could be based on the sample survey, household survey method was adopted using structured closed ended questionnaire, such as for collection of data on socio-economic; households and farm settings; cultivation area under Citrus and Cardamom; production volume for all project targeted crops; marketed volume and average selling prices for the produce marketed; trainings availed by the household members; gender concerns; food security; and household dietary diversity data using recall period of 24 hours.

Additionally, 41 numbers of focus group discussions (FGDs) were undertaken with farmers' experienced in cultivating the project targeted crops (with mix of males and females in a group of about 15 to 35 numbers each) from amongst the farmers that came for individual interview in various different locations. These farmers were selected based on the recommendations by the farmers that gathered for the household interview. In total 878 farmers participated in FGDs (457 males: 421 females). The list of FGDs with location details and numbers of participating farmers segregated by gender is provided as annex 6. The main data collected from FGDs were the productivity of the project targeted crops as it was experienced by the firm in the past that collecting productivity data from household survey for crops cultivated in smaller scale was not an accurate method. The productivity data provided in FGDs were validated by Gewog Agriculture Extension Officers. FGDs were also used to collect added data on types of trainings / capacity building support received by farmers as members of farmers groups; on market information usually received by the households; on existing water user associations (WUAs) conflicts; main constraints facing the households in agriculture (in general and separately for males and females); specific crops that women farmers were interested to cultivate; and expected technologies to overcome agricultural challenges.

Interview was also undertaken (as discussion) with 22 project Gewog Agriculture Extension Officers, mainly to further understand the conflicts in water user associations (WUAs) and agricultural constraints in general. The two officers were out of station during the time of survey (on leave). The list of official met is provided as annex 7.

Using pre-designed closed ended structured questionnaire, day scholars' students were interviewed. The selection of students was random and making mix of males and females from every classes in each school. For boarding student, using pre-designed closed ended structured questionnaire, a group of six students from each school were initially interviewed and later data was validated by the mess in-charge. For both day scholars and boarding students, data collection was for dietary diversity and nutritional issues. In total 401 questionnaires for day scholar students and 10 questionnaires for boarding schools were executed

For those data, that required complete coverage of the HHs and not possible through sample survey, pre-designed e-questionnaire was executed to 24 project Gewog Agriculture Extension Officers (AEOs). The data collected for each Gewog through e-questionnaires were:

1) List of Farmers Groups and Cooperatives with details on location, nature of activities, registration status, membership sizes by gender, gender of office bearers, types of trainings and capacity building support provided; accessibility to types of marketing infrastructures for the groups, and types of market information provided to the group members.
2) List of water user associations within the Gewogs by details and with area under assured irrigation facilities (flood and micro), as per the records maintained by the AEOs.
3) Project targeted crop area in the Gewog under assured irrigation facilities (flood and micro), based on the record maintained by AEOs.
4) The command area for Paddy to be catered by four project supported irrigation schemes and average productivity of Paddy in areas to be benefitted by these irrigation schemes, based on the record maintained by AEOs.

As secondary information, the following documents were reviewed:

1) National Health Survey, Ministry of Health, Royal Government of Bhutan (2012) for data related to consumption of fruits and vegetables.
2) National Nutrition Survey, Department of Public Health, Ministry of Health, Royal Government of Bhutan (2015) for data related to dietary diversity pattern.
3) Bhutan Multiple Indicator Survey, National Statistics Bureau, Royal Government of Bhutan (2010), for data related to anthropometric measurement and findings for children.
4) Annual Education statistics, 2017, Policy and Planning Division, Ministry of Education, to assimilate total numbers of boarding and day scholar students for 16 schools targeted by the project.
5) Agriculture Statistics, 2017, Department of Agriculture, Ministry of Agriculture and Forests, to assimilate data on area under cultivation for Citrus and Cardamom in FSAPP Gewogs.

For detail description regarding the above reports, refer annex 8.

Note: All the baseline information collected and data provided is for the year 2017 (till December 2017).

4. BASELINE FINDINGS

4.1 Demography

The distribution of the surveyed respondents (2469 farmers) for collecting baseline data was 57.9% males and 42.1% females (table 1). The distribution of these respondents by the Gewogs is provided in annex 1 (table 1).

Table 1**:** Count and percentage of farmer-respondents by gender and Dzongkhags

Dzongkhag	Count and %	Gender		Total
		Male	Female	
Samtse	Count	414	208	622
	% within Dzkg	66.6%	33.4%	100.0%
Haa	Count	108	213	321
	% within Dzkg	33.6%	66.4%	100.0%
Chhukha	Count	294	215	509
	% within Dzkg	57.8%	42.2%	100.0%
Sarpang	Count	295	190	485
	% within Dzkg	60.8%	39.2%	100.0%
Dagana	Count	318	214	532
	% within Dzkg	59.8%	40.2%	100.0%
Total	Count	1429	1040	2469
	%	57.9%	42.1%	100%

Source: FSAPP Baseline Household Survey, Oct – Nov 2018, Bhutan Consulting Associates

Out of 2469 households interviewed, 65.7% of the households (HHs) were headed by males and 34.3% by females. Except for Haa Dzongkhag where the majority of the HHs were headed by females (60.1% by females: 39.9% by males), in rest of the 5 Dzongkhags, majority of the HHs are headed by males (table 2). The count of the household heads by the Gewogs is provided in annex 1 (table 2). Applying the survey estimates, 5271 HHs are headed by males and 2752 HHs are headed by females in the project area (covering all 24 Gewogs and considering total of 8023 HHs in entire project area).

Table 2: Count and percentage of household heads by gender and Dzongkhags

Dzongkhag	Count and %	Gender of the HH head		
		Male	Female	Total
Samtse	Count	500	122	622
	% within Dzkg	80.4%	19.6%	100.0%
Haa	Count	128	193	321
	% within Dzkg	39.9%	60.1%	100.0%
Chhukha	Count	293	216	509
	% within Dzkg	57.6%	42.4%	100.0%
Sarpang	Count	369	116	485
	% within Dzkg	76.1%	23.9%	100.0%
Dagana	Count	332	200	532
	% within Dzkg	62.4%	37.6%	100.0%
Total	Count	1622	847	2469
	%	65.7%	34.3%	100%

Source: FSAPP Baseline Household Survey, Oct – Nov 2018, Bhutan Consulting Associates

In 16 schools, there are 8371 numbers of students (boarders 4287: and day scholars 4084 as shown in table 3 on next page. The distribution of the 401 day scholars' students interviewed from 10 different schools is presented in table 4 on next page, wherein 50.1% were male students and 49.9 were female students. From the same 10 schools, data for the boarding students were collected using single sheet of questionnaire for each school (initially data contributed by a group of boarding students and validated by school mess in-charge).

Table 3: List of FSAPP targeted schools with student population

Dzongkhag	Gewog	Name of School with feeding support organisation	Boarders	Day scholars	Total
Dagana	Drujeygang	Drujeygang HSS (RGoB)	686	262	948
	Lhamoizingkha	Lhamoizingkha MSS (RGoB)	312	468	780
Haa	Gakiling	Rangtse PS (WFP)	141	50	191
	Uesu	Tshaphel LSS (WFP)	194	299	493
	Samar	Gyenkhana PS (WFP)	184	26	210
Chukha	Bongo	Pakshikha Central School (RGoB)	712	138	850
		Bongo PS (WFP)	38	33	71
		Chungkha PS (Both WFP (RGoB)	0	128	128
	Dungna	Dungna LSS (WFP)	292	69	361
	Getana	Getana Ps (WFP)	90	41	131
Samtse	Dophuchen	Dorokha Central School (RGoB)	503	546	1049
		Sengdhen LSS (RGoB)	386	191	577
		Denchukha LSS (RGoB)	156	220	376
		Mindruling PS (RGoB)	90	75	165
	Tading	Tabadramtoe PS (RGoB)	0	399	399
	Tendruk	Tendruk HSS (RGoB)	503	1139	1642
Total			4287	4084	8371
Total from 10 surveyed schools (light shaded above)			3757	2922	6679

Source: Annual Education Statistics, 2017, PPD, Ministry of Education, RGoB

Note: From list of 17 schools in Project Document, Soeltapsa is excluded as per the project advice (as is not under school feeding program now) and the shaded ones above were sampled schools.

Table 4: Count and percentage of day scholar students interviewed by gender and by the schools

Sl. No.	**Schools**	**Count and %**	Gender		Total	
			Male	Female	Count	% of total
1	Tendruk Central School	Count	67	73	140	34.9
		% within School	47.9%	52.1%	100.0	
2	Dorokha Central School	Count	34	36	70	17.5
		% within School	48.6%	51.4%	100.0	
3	Sengdhyen Lower Secondary School	Count	14	17	31	7.7
		% within School	45.2%	54.8%	100.0	
4	Drujeygang Central School	Count	23	17	40	10.0
		% within School	57.5%	42.5%	100.0	
5	Lhamoizingkha Central School	Count	31	29	60	15.0
		% within School	51.7%	48.3%	100.0	
6	Dungna Lower Secondary School	Count	5	5	10	2.5
		% within School	50.0%	50.0%	100.0	
7	Pakshikha Central School	Count	10	10	20	5.0
		% within School	50.0%	50.0%	100.0	
8	Bongo Primary School	Count	7	3	10	2.5
		% within School	70.0%	30.0%	100.0	
9	Gyenkhana Primary School	Count	5	5	10	2.5
		% within School	50.0%	50.0%	100.0	
10	Rangtse Primary School	Count	5	5	10	2.5
		% within School	50.0%	50.0%	100.0	
	Total	Count	201	200	401	100.0
		% within Schools	50.1%	49.9%	100.0	

Source: FSAPP Baseline Schools Survey, Oct – Nov 2018, Bhutan Consulting Associates

In total 9.5% of the farmers' respondents reported their households being single mother headed. Amongst the Dzongkhags, as high as 15.2% HHs from Dagana were single

mother headed, followed by Haa (with 12.8%), Samtse (7.7%), Sarpang (6.8%) and Chhukha (6.3%) as reflected in table 5. The Gewog-wise count of single mother headed HHs is provided in annex 1 (table 3). It is therefore estimated that 762 HHs out of total 8023 are single mother headed households in the entire project area.

Table 5: Count and percentage of single mother headed households by Dzongkhags

Dzongkhag	Count and %	Single Mother headed HHs		
		Yes	No	Total
Samtse	Count	48	574	622
	% within Dzkg	7.7%	92.3%	100.0%
Haa	Count	41	280	321
	% within Dzkg	12.8%	87.2%	100.0%
Chhukha	Count	32	477	509
	% within Dzkg	6.3%	93.7%	100.0%
Sarpang	Count	33	452	485
	% within Dzkg	6.8%	93.2%	100.0%
Dagana	Count	81	451	532
	% within Dzkg	15.2%	84.8%	100.0%
Total	Count	235	2234	2469
	%	9.5%	90.5%	100%

Source: FSAPP Baseline Household Survey, Oct – Nov 2018, Bhutan Consulting Associates

A list of 8023 agricultural households for 24 project Gewogs, as available with Statistical Unit, Policy and Planning Division, Ministry of Agriculture and Forests was used as sample population for the baseline survey. The list however, does not have population details segregated by the gender. Initially it was planned to use secondary data from Population and Housing Census of Bhutan, 2017, to arrive at number of project beneficiaries but on compilation, it was not possible to segregate those persons residing and as agricultural beneficiaries of the project. This is as the population reflected included every persons counted on the day of census, be it persons from other Dzongkhags including the civil servants and travelers. It was further found that population data available with Gewog administration is inclusive of non-residing households (empty households) and data on entire records of civil registration but not segregated by agricultural households. Therefore to arrive at number of beneficiaries, segregated by gender, national average household size of 3.9 was applied as per Population and Housing Census of Bhutan, 2017. The population for 8023 HHs is 31290 (8023 X 3.9). A 30% of 31290 are 9387 expected numbers of female beneficiaries. The projected target in the log-frame (10,400 HHs and with 15,600 female beneficiaries) was estimated using similar method but with HH size of 5 persons and 30% of total population as targeted female beneficiaries. However, on applying national average ratio between male and female, for a population of 31290 from 24 project Gewogs, 15676 are males and 15614 are females as shown in table 6.

Table 6: Estimation on number of project beneficiaries segregated by gender

National population	681720
National male population	341881
National female population	339839
National Male %	50.1
National Female %	49.9
National average HH size	3.9
Estimated Population for 8023 HHs (8023 X 3.9)	31290
30% as female beneficiaries	9387
50.1 % Males out of 31290	15676
49.9 % Female out of 31290	15614

Source: National Population and average HH sizes from Population and Housing Census of Bhutan, 2017

4.2 Households Socio-Economics

4.2.1 Household Assets

Amongst important households assets owned, almost all the households (95.3%) own cell phones (i.e. 7643 HHs out of total 8023); followed by rice cooker / curry cooker by 93.4% (7493 HHs in entire project area); TV/DVD/Radio by 72.5% (5817 HHs); LPG cylinder and stove by 68.1% (5466 HHs); refrigerator by 46.5% (3727 HHs); sprinklers by 20.6% (1654 HHs); vehicles (including motor cycles) by 17.9% (1436 HHs); cloth washing machine by 7.3% (588 HHs); rice huller by 5.3% (429 HHs); maize flour mill by 3.6% (292Hhs); power tiller by 3.4% (273 HHs); and relatively smaller percentages of HHs with other assets as presented in figure 1. In overall very few HHs have agricultural equipments or machineries such as transplanter, thresher, harvester, chips or flake making machines, agro-processing machines, and even power tillers. The Dzongkhag wise distribution of the HHs with assets owned is provided in annex 1 (table 4).

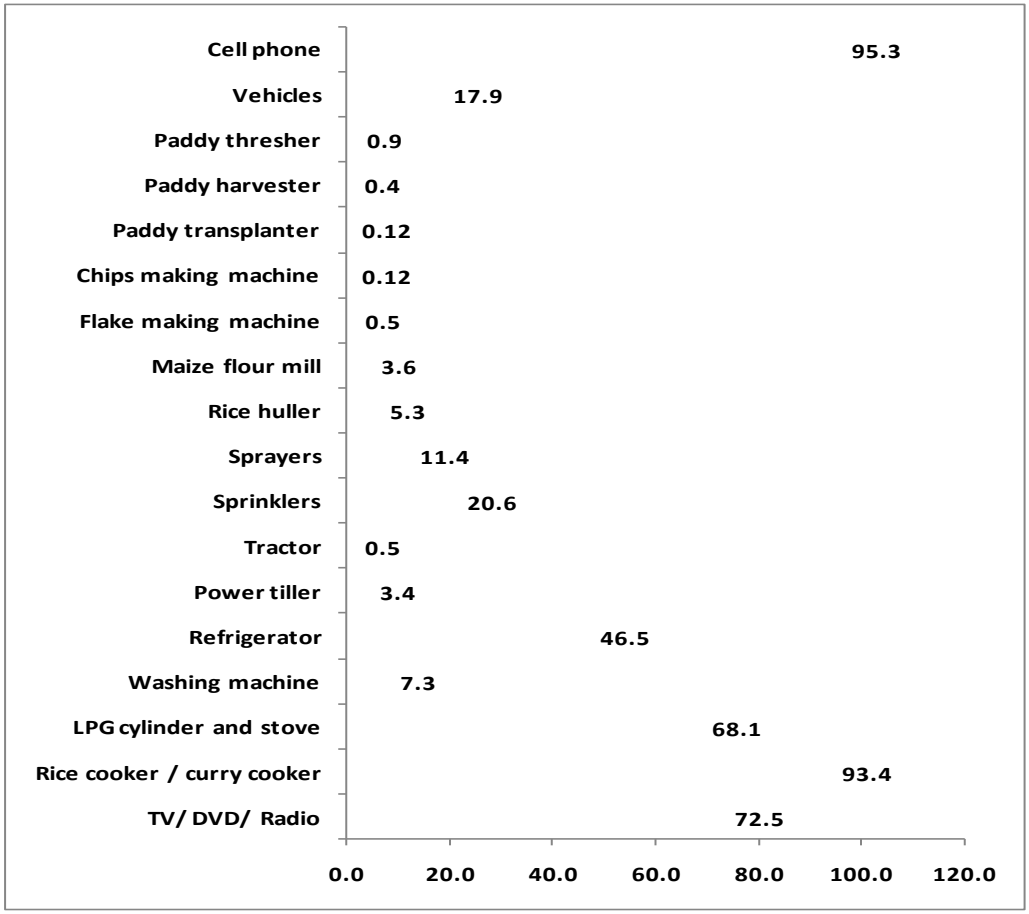

Figure 1: Percentage of households by types of household assets owned
Source: FSAPP Baseline Household Survey, Oct – Nov 2018, Bhutan Consulting Associates

4.2.2 Types of Houses Owned

Looking at the types of houses owned by the households, as high as 32.1% (2574 HHs from entire project area) have houses with concrete wall and corrugated galvanised iron (CGI) roof; followed by another 31.8 % (2554 HHs) with mud and stone wall and CGI roof; wooden wall with CGI roof by 11.4% (916 HHs); thatched / bamboo wall with CGI roof by 9.6% (767 HHs); mud and stone wall with shingle roof by 4.6% (370 HHs); concrete wall with shingle roof by 4.5% (357HHs); and smaller percentages of HHs with other types of houses as shown in figure 2 on next page. The Dzongkhag-wise distribution on types of houses owned by the households is provided in annex 1 (table 5).

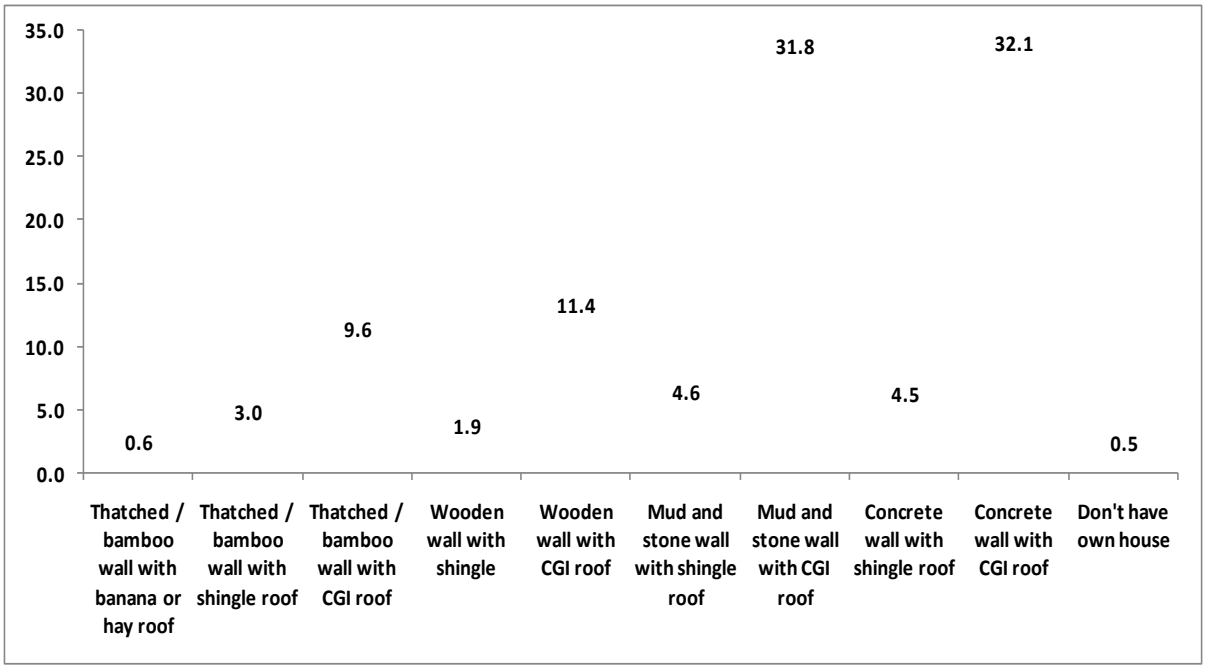

Figure 2: Percentage of households by types of houses owned
Source: FSAPP Baseline Household Survey, Oct – Nov 2018, Bhutan Consulting Associates

4.2.3 Types of Toilets Owned

With regards to types of toilets owned by the households, higher percentages of HHs is all Dzongkhags have flush type outside their houses as reported by 39.9% of the HHs in total (i.e. 3210 HHs) as shown in table 7. Another 23.1% HHs have pit latrine with cover (1853 HHs); followed by 13% HHs having flush type outside inside the houses (1043 HHs); 12.2% having ventilated improved pit toilets (979 HHs); 11.8% HHs with pit latrine without cover (947); and smaller percentages of HHs either doing open defecation (48 HHs) or sharing latrine with other households (56 HHs), as shown in the table.

Table 7: Count and percentage of farmer-respondents by types of toilets owned and by Dzongkhags

Types of Toilets Owned	**Count and %**	Dzongkhag					Total	
		Samtse	Haa	Chhukha	Sarpang	Dagana	Count	% of total
Flush type inside house	Count	43	84	24	132	37	320	13.0
	% in Dzkg	6.9%	26.2%	4.7%	27.2%	7.0%		
Flush type outside house	Count	226	97	167	224	271	985	39.9
	% in Dzkg	36.3%	30.2%	32.8%	46.2%	50.9%		
Ventilated improved pit latrine	Count	172	47	75	6	2	302	12.2
	% in Dzkg	27.7%	14.6%	14.7%	1.2%	0.4%		
Pit latrine with cover	Count	178	14	85	116	178	571	23.1
	% in Dzkg	28.6%	4.4%	16.7%	23.9%	33.5%		
Pit latrine without cover	Count	9	75	149	18	41	292	11.8
	% in Dzkg	1.4%	23.4%	29.3%	3.7%	7.7%		
Open (outside)	Count	0	4	7	2	1	14	0.6
	% in Dzkg	0.0%	1.2%	1.4%	0.4%	0.2%		
Sharing latrine with other HH	Count	4	0	3	5	6	18	0.7
	% in Dzkg	0.6%	0.0%	0.6%	1.0%	1.1%		
Total	Count	622	321	509	485	532	2469	100.0

Source: FSAPP Baseline Household Survey, Oct – Nov 2018, Bhutan Consulting Associates

4.2.4 Main Sources of Income

Amongst the various sources of income to the rural households, agriculture remains to be one main source of income to 87.8% HHs (i.e. 5286 HHs out of total 8023); 40.5% HHs (2437 HHs) have income from livestock; 35.2% (2122 HHs) have income from off farm activities; 27.4% (2200 HHs) have income from remittances or as regular salary / pension; another 9.2% (554 HHs) have income from business; and 4.6% (278 HHs) have income from non-wood forest products (figure 3).

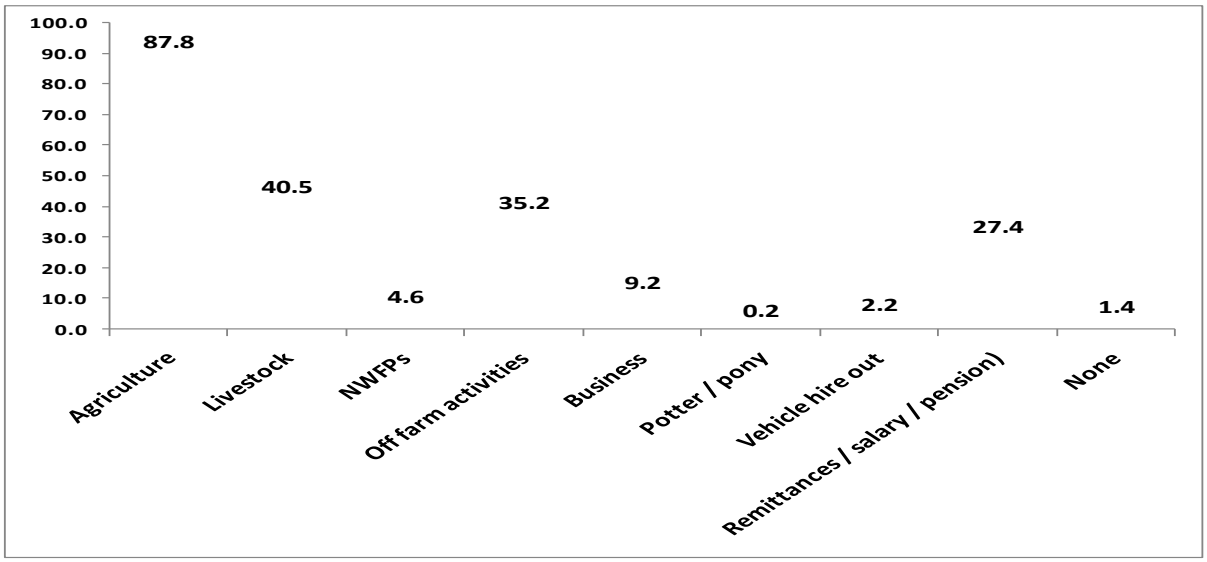

Figure 3: Percentage of households with various sources of cash income
Source: FSAPP Baseline Household Survey, Oct – Nov 2018, Bhutan Consulting Associates

A small percentage of HHs also has income from vehicle hiring out, and as potter or using pony to transport loads. Only 1.4% (85 HHs) reported having no cash income sources. The Dzongkhag-wise distribution (count and percentages of respondents) with various sources of income is provided in annex 1 (table 6).

4.2.5 Annual Income from All Sources

For a higher percentages of the HHs (28.0%, i.e.2249 HHs), average annual cash income from all sources ranges between Nu. 50,001 to 100,000. While a 19.2% HHs (1544 HHs) have annual income ranging between Nu. 30,001 to 50,001, a good percentage of HHs (18.3%, i.e. 1469 HHs) have income ranging between Nu. 100,001 to 200,000 in a year. Substantial number of households (13.6% i.e. 1092 HHs) earn an annual cash income between Nu. 15,001 to 30,000 and another 7.1% (572 HHs) have income between Nu. 5001 to 15,000 in a year. A 2.6% (205 HHs) have income less than Nu. 5000 per year and 0.1% (10 HHs) though does not have cash income but undertakes bartering of produce for essential household's commodities and items. Applying the survey estimates, 114 HHs out of 8023 (1.4%) in the project area does not have any source of cash income (table 8 on next page).

The Dzongkhag-wise analysis also reflects that for higher percentages of HHs from all five Dzongkhags, the average annual cash income ranges between Nu. 50,001 to 100,000. A slightly higher percentage of HHs from Chhukha, Haa and Sarpang has income between Nu. 100,001 to Nu. 200,000 as compared to Samtse and Dagana. Only Haa and Chhukha Dzongkhags have significant percentage of HHs (17.4% in Haa and 15.1% in Chhukha) having income above Nu. 200,000 per year, as compared to other Dzongkhags (6.4% each in Sarpang and Samtse; and 6.2% in Dagana).

Table 8: Count and percentage of farmer-respondents with average annual cash income from all sources and by Dzongkhags

Income Range (Nu.)	**Count and %**	Dzongkhag					Total	
		Samtse	Haa	Chhukha	Sarpang	Dagana	Count	% of total
< 5000	Count	12	12	19	6	14	63	2.55
	% in Dzkg	1.9%	3.7%	3.7%	1.2%	2.6%		
5001 to 15,000	Count	44	17	27	24	64	176	7.13
	% in Dzkg	7.1%	5.3%	5.3%	4.9%	12.0%		
15,001 to 30,000	Count	107	18	54	61	96	336	13.61
	% in Dzkg	17.2%	5.6%	10.6%	12.6%	18.0%		
30,001 to 50,000	Count	137	42	85	104	107	475	19.24
	% in Dzkg	22.0%	13.1%	16.7%	21.4%	20.3%		
50,000 to 100,000	Count	179	103	137	153	120	692	28.03
	% in Dzkg	28.8%	32.1%	26.9%	31.5%	22.6%		
100,000 to 200,000	Count	94	64	105	99	90	452	18.31
	% in Dzkg	15.1%	19.9%	20.6%	20.4%	16.9%		
Above 200,000	Count	40	56	77	31	33	237	9.60
	% in Dzkg	6.4%	17.4%	15.1%	6.4%	6.2%		
No cash but do bartering	Count	0	0	2	1	0	3	0.12
	% in Dzkg	0.0%	0.0%	0.4%	0.2%	0.0%		
Don't have cash income	Count	9	9	3	6	8	35	1.42
	% in Dzkg	1.4%	2.8%	0.6%	1.2%	1.3%		
Total	Count	622	321	509	485	532	2469	100

Source: FSAPP Baseline Household Survey, Oct – Nov 2018, Bhutan Consulting Associates

4.2.6 Annual Income from Agriculture

In a separate analysis to look at average annual income to the households from agriculture alone (excluding all other sources, and not even from livestock and non-wood forest products), it was found that as high as 17.2% HHs (1378 HHs out of 8023) have cash income ranging between Nu. 15,001 to 30,000; followed by 16.2% (1300 HHs) with income between Nu. 5001 to 15,000; another 15.8% (1264 HHs) with income between Nu. 30,001 to 50,000; and 15.7% (1261 HHs) with income ranging from Nu. 50,001 to 100,000 (table 9).

Table 9: Count and percentage of farmer-respondents with average annual cash income from agriculture and by Dzongkhags

Income Range (Nu.)	**Count and %**	Dzongkhag					Total	
		Samtse	Haa	Chhukha	Sarpang	Dagana	Count	% of total
< 5000	Count	90	16	45	77	79	307	12.4
	% in Dzkg	14.5%	5.0%	8.8%	15.9%	14.8%		
5001 to 15,000	Count	114	23	56	100	107	400	16.2
	% in Dzkg	18.3%	7.2%	11.0%	20.6%	20.1%		
15,001 to 30,000	Count	129	41	50	96	108	424	17.2
	% in Dzkg	20.7%	12.8%	9.8%	19.8%	20.3%		
30,001 to 50,000	Count	107	47	90	66	79	389	15.8
	% in Dzkg	17.2%	14.6%	17.7%	13.6%	14.8%		
50,000 to 100,000	Count	79	100	111	39	59	388	15.7
	% in Dzkg	12.7%	31.2%	21.8%	8.0%	11.1%		
100,000 to 200,000	Count	26	33	73	25	27	184	7.5
	% in Dzkg	4.2%	10.3%	14.3%	5.2%	5.1%		
Above 200,000	Count	10	18	36	4	2	70	2.8
	% in Dzkg	1.6%	5.6%	7.1%	0.8%	0.4%		
Don't have cash income	Count	67	43	48	78	71	307	12.4
	% in Dzkg	10.8%	13.4%	9.4%	16.1%	13.3%		
Total	Count	622	321	509	485	532	2469	100

Source: FSAPP Baseline Household Survey, Oct – Nov 2018, Bhutan Consulting Associates

Significantly, 12.4% (998 HHs) have income less than Nu. 5000 per year from agriculture; but 7.5% (598 HHs) have income between Nu. 100,001 to 200,000; and another 2.8% (227 HHs) reported having income of more than Nu. 200,000 from agriculture alone. A 12.4% (998 HHs) reported having no cash income from agricultural activities.

There are variations amongst the Dzongkhags. In Samtse, a higher percentage of HHs (20.7%) has income ranging between Nu. 15,001 to 30,000 per year from agriculture as compared to other income ranges. In Haa and Chhukha, higher percentages (31.2% in Haa and 21.8% in Chhukha) reported average annual income between Nu. 50,001 to 100,000; and like wise significant percentages of HHs (5.6% in Haa and 7.1% in Chhukha) reported having income above Nu. 200,000 per year from agriculture, as compared to other Dzongkhags. From Sarpang and Dagana, higher percentages of HHs reported having income between Nu. 5001 to 15,000 or between Nu. 15,001 to Nu.30,000 as shown in the table.

4.2.7 Income by Earners and Head of the Households

For higher percentage of HHs (29.7%) the main income earner remains to be solely father of the household; or by the parents (for 21.9% HHs); significantly solely by mother of the households (for 10.1% HHs); and by members jointly in the HHs for 13.5%. It's solely by sons for 7.1% HHs; by parents and sons for 6.2%; parents, sons and daughters for 6.4%; solely by daughters for 2.1%, and parents and daughters for 1.5% HHs. The Dzongkhag-wise analysis on main income earner to the households is provided in annex 1 (table 7).

The average annual income segregated by the head of the household is provided in table 10. It clearly shows that for all income ranges starting Nu. 5000 to more than Nu. 200,000, higher percentage of HHs falls in category headed by males. For income below Nu. 5000 per year, its 49.2% HHs headed by male and 50.8% headed by female.

Table 10: The average annual income to the households segregated by head of the households

Income ranges	Count and %	Gender of the HH head		Total
		Male	Female	
< 5000	Count	31	32	63
	%	49.2%	50.8%	100.0%
5001 to 15,000	Count	113	63	176
	%	64.2%	35.8%	100.0%
15,001 to 30,000	Count	224	112	336
	%	66.7%	33.3%	100.0%
30,001 to 50,000	Count	313	163	476
	%	65.8%	34.2%	100.0%
50,001 to 100,000	Count	458	234	692
	%	66.2%	33.8%	100.0%
100,001 to 200,000	Count	311	141	452
	%	68.8%	31.2%	100.0%
Above 200,000	Count	150	87	237
	%	63.3%	36.7%	100.0%
No cash but do bartering	Count	3	0	3
	%	100.0%	0.0%	100.0%
Don't have cash income	Count	19	15	34
	%	55.9%	44.1%	100.0%
Total	Count	1622	847	2469

Source: FSAPP Baseline Household Survey, Oct – Nov 2018, Bhutan Consulting Associates

In another analysis on cross tabulation of income earners with head of the households, importantly it was found that for majority of households having income earners as solely

mother (76% HHs), as solely daughters (64.7%), and as parents and daughters (59.5% HHs), were headed by females (table 11).

Table 11: The income earners to the households segregated by head of the households

Income Earner	Count & %	Gender of the HH head		Total
		Male	Female	
Solely father	Count	611	123	734
	%	83.2%	16.8%	100.0%
Solely mother	Count	60	190	250
	%	24.0%	76.0%	100.0%
Father and mother	Count	329	213	542
	%	60.7%	39.3%	100.0%
Solely sons	Count	133	42	175
	%	76.0%	24.0%	100.0%
Parents and sons	Count	109	45	154
	%	70.8%	29.2%	100.0%
Solely daughter	Count	18	33	51
	%	35.3%	64.7%	100.0%
Parents and daughters	Count	15	22	37
	%	40.5%	59.5%	100.0%
Parents, sons and daughters	Count	90	68	158
	%	57.0%	43.0%	100.0%
All residing in the household	Count	238	96	334
	%	71.3%	28.7%	100.0%
Don't have cash income	Count	19	15	34
	%	55.9%	44.1%	100.0%
Total	Count	1622	847	2469
	%	65.7%	34.3%	100.0%

Source: FSAPP Baseline Household Survey, Oct – Nov 2018, Bhutan Consulting Associates

4.3 Farmers Groups and Cooperatives

4.3.1 Inventory of Farmers Groups and Cooperatives

The details on each of the farmers groups (FGs) and cooperatives (CooPs) are provided as annex 2 (divided into three tables) which provides details on the followings:

1) Name of the FGs and Cooperative with location (village), Gewog, Dzongkhags and year of establishment (annex 2, table 1)
2) Name, functionalities, types, registration status, operational status, and membership by gender (annex 2, table 2).
3) Gender of the office bearers, types of capacity building availed, accessibility to marketing infrastructures by types, and types of market information received (annex 2, table 3).

Out of 24 FSAPP Gewogs, 20 Gewogs in total have 98 numbers of FGs and CooPs, the distribution by the functionalities (nature of activities) and by the Dzongkhags is reflected in table 12 on next page. The remaining 4 Gewogs reported not having any agricultural farmers groups or cooperatives till December 2017.

Looking at the nature of activities, 40 are irrigation water user and maintenance groups; 33 are reported to be groups on vegetable production and marketing; 10 are as road user and maintenance groups; 7 are cardamom production groups (but reported as non-functional); 4 are groups on electric fencing maintenance and use; 2 are savings groups; 1 is ginger production and another 1 is on organic buckwheat production as reflected in table 12. The distribution of these FGs and CooPs by the nature of activities and by the Gewogs is provided in annex 2, table 4.

Table 12: Count of farmers groups and cooperatives by functionalities and by Dzongkhags

Functionalities (Nature of Farmers Groups or Cooperatives)	Dzongkhag					Total
	Chhukha	Dagana	Haa	Samtse	Sarpang	
Vegetable Production	3	6	1	14	9	33
Cardamom Production	0	0	0	7	0	7
Ginger Production	0	0	0	1	0	1
Organic Buckwheat Production	0	0	1	0	0	1
Group Savings	0	0	0	2	0	2
Irrigation water use and maintenance	8	19	1	11	1	40
Road user and maintenance	2	1	1	6	0	10
Electric fencing user and maintenance	0	0	0	4	0	4
Total	13	26	4	45	10	98

Source: FSAPP Gewog Agriculture Officer, Nov, 2018

Except one under Dophuchen Gewog (which is a registered group saving cooperative), all other 97 are farmers groups. Amongst these 97 FGs, 11 are registered farmers groups, and all remaining ones are non-formal. The registered farmers groups are: 1 vegetable production group from Chhukha; 2 vegetable production groups from Dagana; 1 organic buckwheat production group from Haa; and 7 cardamom production groups from Samtse Dzongkhag (but all non-functional). Out of 98 groups, 15 are reported to be non-functional.

4.3.2 Membership in Farmers Groups by Gender

For 98 FGs and Coops, membership strength is 3053 farmers with 68.8% males (2101 nos.) and 32.2% females (952 nos.). This is 38.1% (3053 HHs) of the total households in the project area (out of 8023 HHs) as the member of agricultural FGs or CooPs, considering that there is no double counting of the households (i.e. a household is not a member of multiple groups). For these details for each of the FGs and CooPs, refer annex 2, table 2.

Looking at the gender of the office bearers for these 98 FGs and CooPs, it was found that out of 294 responses for office positions as chairpersons, secretary and treasurer, 46 positions are not applicable or not elected yet. From the remaining 248 elected positions, 81% are males and 19% are females (table 13). For these details for each of the FGs and CooPs, refer annex 2, table 3.

Table 13: Gender of the officer bearers of farmers groups and cooperatives

Gender	Chairperson (Nos)	Secretary (Nos)	Accountant (Nos)	Total	%
Male	77	66	58	201	81.0
Female	13	17	17	47	19.0
Have None	8	15	23	46	
Total	98	98	98	294	

Source: FSAPP Gewog Agriculture Officer, Nov, 2018

Amongst the respondents for the survey, 80% were not members of any of the agricultural farmers groups or cooperatives. From remaining, 12.7% were males as members and 7.2% were females (table 14 on next page). Taking a total of 493 respondents as member of agricultural groups, from within them, 63.4% were registered as males and 36.3% as females. As exact list of existing FGs and CooPs established till Dec 2017 were already collected, along with membership and gender of the members, this survey data from respondents is not used to encapsulate for the entire population.

In another analysis based on the survey respondents, out of 495 respondents as members of FGs and CooPs, 5.3% were chairpersons; 2.4% were secretaries; and 4.8% were treasurers for the groups (refer annex 2, table 5 for Dzongkhag wise details).

Table 14: Count and percentage of farmer-respondents as members of agricultural groups by gender and by Dzongkhags

Gender of the member	**Count and %**	Dzongkhag				Total	% out of Members
		Samtse	Chhukha	Sarpang	Dagana		
Male	Count	109	37	96	72	314	63.4
	% in Dzkg	17.5%	7.3%	19.8%	13.5%	12.7%	
Female	Count	34	38	58	42	179	36.3
	% in Dzkg	5.5%	7.5%	12.0%	7.9%	7.2%	
Not a member of any FGs or CooPs	Count	479	434	331	418	1976	
	% in Dzkg	77.0%	85.3%	68.2%	78.6%	80.0%	
Total	Count	622	509	485	532	2469	493

Source: FSAPP Baseline Household Survey, Oct – Nov 2018, Bhutan Consulting Associates

4.3.3 Trainings and Supports related to Groups

In terms of types of technical and other capacity building received by 98 listed FGs and CooPs, 25 out of 98 groups have availed technical trainings, mostly vegetable cultivation techniques, and few have also received technical trainings on seed selection, and ginger cultivation and pest management as reflected in table 15. Four groups on electric fencing have received infrastructures management training. Two groups (one on road user and maintenance; and another on irrigation water user and maintenance) have received managerial training i.e. record keeping. Therefore, in total 31 farmers groups have availed either technical or other capacity building support. Remaining 67 groups have not received or availed any of the trainings (Refer annex 2, table no. 3 for details on trainings availed by the each of the FGs and CooPs). However, it is worthwhile to mention that all FGs and CooPs initially get awareness on group development, on their functionalities and modalities, need to have by-laws, and also are usually made aware to have a group fund.

Table 15: Count on types of trainings / capacity building support availed by the farmer groups and cooperatives by nature of the activities

Types of Farmers Groups or Cooperatives	Types of Trainings availed				Total
	Technical	Infrastructure Maintenance and use	Managerial	None	
Vegetable Production	25	0	0	8	33
Cardamom Production	0	0	0	7	7
Ginger Production	0	0	0	1	1
Organic Buckwheat Production	0	0	0	1	1
Group Savings	0	0	0	2	2
Irrigation water use and maintenance	0	0	1	39	40
Road user and maintenance	0	0	1	9	10
Electric fencing user and maintenance	0	4	0	0	4
Total	25	4	2	67	98

Source: FSAPP Gewog Agriculture Officer, Nov, 2018

In a separate analysis with data collected from survey respondents based on multiple responses, it was found that 16.3% of total respondents (2469) have obtained awareness on benefits of working in groups; 9.9% were aware of need to have group fund; 9.7% knew need for bye-laws for the groups; 4.6% (369HHs out of 8023) got technical trainings related to production; 3.6% got trained on safe handling of equipments and machineries; 3.1% were trained on book keeping; 2.4% were trained in leadership and management; and other smaller percentages of HHs in others types as reflected in figure 4 on next page. About 80% of the respondents have not availed any trainings implies that 20% (1605 out of total 8023) have availed either technical or other capacity building support as members of FGs and CooPs. The Dzongkhag wise detail is provided in annex 2, table 6.

Additionally, tapped from Focus Group Discussion (FGD) with farmers, the most commonly mentioned trainings / capacity building availed by the farmers as members of FGs and CooPs were as follows:

- Production techniques (use of green house, proper bed making, proper germination of seedlings, maintaining proper distance between plants for higher yield, proper quantity of manure to be used, compost making, pest control using organic pesticides, mulch, benefits of crop rotation, seed storage methods, and cultivation of vegetables and ginger).
- Awareness of benefits in working in groups.
- Use of pipes and sprinklers; and drip irrigation techniques
- Managerial trainings (such as accounting, leadership and management as mentioned by few of the farmers).
- Fruit trees pruning and grafting, and land management (terracing and contour farming).
- Exposure trips within Bhutan to production farms and research centres.
- Despite having road and irrigation water user groups, there were no mention of any trainings availed, though farmers reported that they regularly clean and maintain the channel and the farm road.

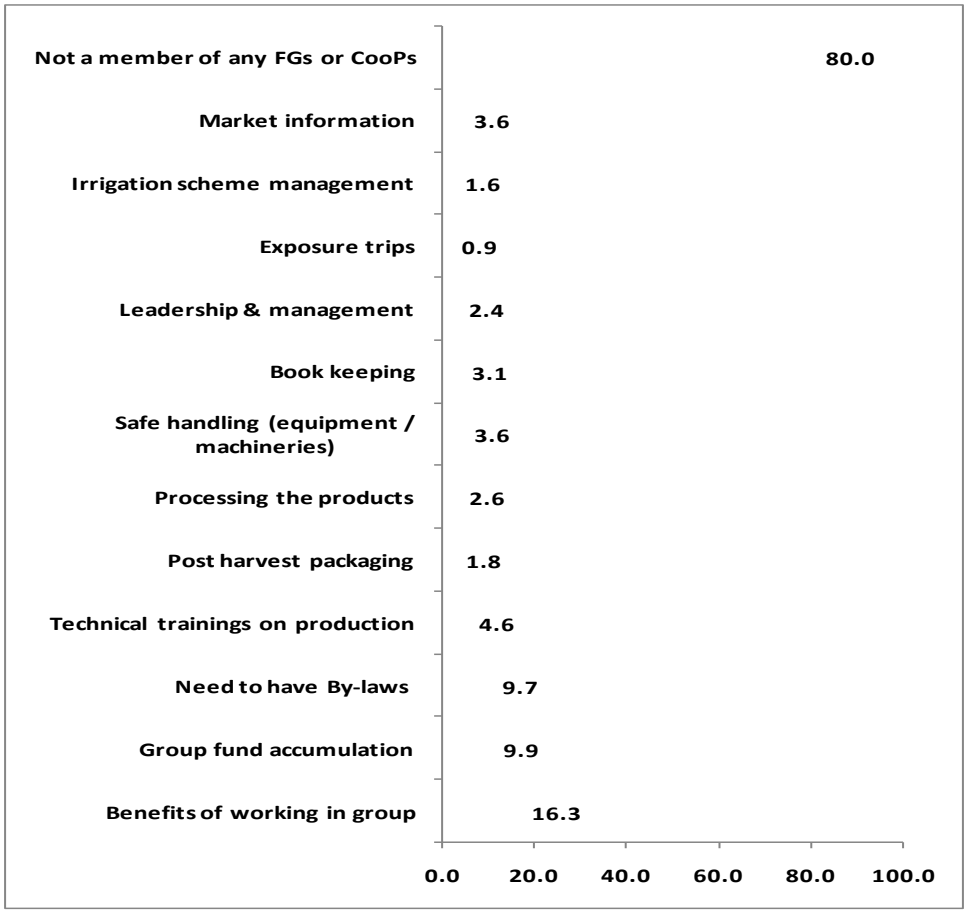

Figure 4: Percentage of farmer-respondents with types of awareness / trainings availed as member of farmers groups or cooperatives by the Dzongkhags
Source: FSAPP Baseline Household Survey, Oct – Nov 2018, Bhutan Consulting Associates

4.3.4 WUAs with Area under Assured Irrigation Facilities and Conflicts

Out of total 40 Irrigation water users and maintenance farmers groups (as provided in the inventory of the FGs and CooPs), 35 were listed to have assured irrigation facilities. A summary of the acreage under assured irrigation facilities for these WUAs is reflected

in table 16. It shows that 1842.1 acres is under assured flood (surface) irrigation and another 29 acres under assured micro-irrigation for these WUAs, as per the records maintained by Gewog agriculture officers. The WUAs details by the location, Gewogs, Dzongkhags and area under assured irrigation for each is provided in annex 2, table 7.

Table 16: Area under assured irrigation facilities for water user associations by the Dzongkhags and by the membership of the households

Dzongkhag	Total Members as Households	Area covered by Assured Flood Irrigation (Acres)	Area covered by Assured Micro Irrigation (Acres)
Chhukha	203	412.99	0
Dagana	552	963.97	9
Haa	11	10.1	0
Samtse	289	255	20
Sarpang	67	200	0
Total	1122	1842.1	29

Source: FSAPP Gewog Agriculture Officer, Nov, 2018

In terms of actual number of beneficiaries with assured irrigation facilities, 1122 HHs are the members of user groups and multiplied by national average household size of 3.9 persons (as per Population and Housing Census of Bhutan, 2017), in total 4376 persons are actual number of user groups. However, in a separate analysis from household survey, 15.3% of respondents (i.e. 1228 HH out of 8023 HHs) have indicated having assured irrigation facilities as being the member of WUAs as shown in table 17.

Table 17: Count and percentage of farmer-respondents having assured irrigation facilities (as being member of the WUAs) by Dzongkhags.

Having Assured Irrigation	Count and %	Dzongkhag					Total	Out of 8023
		Samtse	Haa	Chhukha	Sarpang	Dagana		
Yes	Count	89	9	12	126	142	378	1228
	% in Dzkg	14.3	2.8	2.4	26.0	26.7	15.3	15.3
No	Count	31	23	19	62	42	177	578
	% in Dzkg	5.0	7.2	3.7	12.8	7.9	7.2	7.2
Not a member of any WUAs	Count	502	289	478	297	348	1914	6218
	% in Dzkg	80.7	90.0	93.9	61.2	65.4	77.5	77.5
Total	Count	622	321	509	485	532	2469	8023

Source: FSAPP Baseline Household Survey, Oct – Nov 2018, Bhutan Consulting Associates

For four irrigation schemes to be supported by the project, out of total command area of 1346 acres, at baseline, 273.16 acres is under flood irrigation, the details by the schemes from four Gewogs is provided in table 18.

Table 18: Area under flood irrigation for four irrigation schemes to be supported by project by schemes and Gewogs.

Sl. No.	Name of the irrigation channel	Gewog	Command Area (Acres) as per PAD	Present Area under Flood Irrigation (Acres)
1	Birkulo-Samlachen	Dophuchen	50	21.39
2	ThareyKhola	Norbugang	648	153.01
3	RateyKhola	Dekiling	338	0
4	LaringKhola	Gakidling	310	98.76
Total / Average			1346	273.16

Source: FSAPP Gewog Agriculture Officer, March, 2019

The most common conflicts in WUAs as mentioned by farmers in FGDs were owing to water scarcity during the peak seasons. Despite having customary practices of water distribution for Paddy and having nominated water guard to make proper distribution, the households in uphill have the advantage of getting first the ample water and those residing at low lands often get less and untimely. This often leads to stealing water (mostly active at nights) and thus arising to conflicts amongst the neighbours, though

not of serious offences. Another problem is the shortage of labour in the households for routine maintenance of channel as required. At times, some prefer to pay in lieu of labour but having manpower is preferred over the cash payment. At times during summer flash flood or heavy rain, there are seepages and drainage that affect neighbour's land and conflict arises.

4.4 Production, Productivity, Marketed Volume and Value

4.4.1 Households Producing Targeted Crops

Based on the farmers reporting having produced project targeted crops in the year 2017, it was found that out of 2469 households interviewed, 47.2% produced Paddy (i.e. 3789 HHs out of total 8023 HHs); 46.5% (3730 HHs) produced Potato, 60.7% (4871 HHs) produced Chilli; Cauliflower (27.4%; 2200 HHs); Cabbage (33.5%; 2684 HHs); Beans (55.4%; 4449 HHs); Tomato (20.3%; 1631 HHs); Onion (12.3%; 985 HHs); Broccoli (18.7%; 1501 HHs); Carrot (15.3%; 1228 HHs); Pea (10.1%; 809 HHs); Green leafy vegetables (68.2%; 5472 HHs); Ginger (30.5%; 2450 HHs); Black pepper (0.5%; 39 HHs); Quinoa (1.5%; 117 HHs); Citrus (6.8%; 549 HHs) and Large Cardamom (42 %; 3373 HHs) as reflected in table 19.

Table 19: Count and percentage of households producing project targeted crops

Crops	Paddy	Potato	Chili	Cauli-flower	Cabbage	Beans	Tomato	Onion	Broccoli
Count	1166	1148	1499	677	826	1369	502	303	462
%	47.2	46.5	60.7	27.4	33.5	55.4	20.3	12.3	18.7
Total HHs	3789	3730	4871	2200	2684	4449	1631	985	1501

Crops	Carrot	Pea	Green leafy veg	Ginger	Black pepper	Quinoa	Citrus	Large Cardamom
Count	378	249	1684	754	12	36	169	1038
%	15.3	10.1	68.2	30.5	0.5	1.5	6.8	42.0
Total HHs	1228	809	5472	2450	39	117	549	3373

Source: FSAPP Baseline Household Survey, Oct – Nov 2018, Bhutan Consulting Associates

Within the Gewogs, less than 50% of the HHs producing Paddy was from Tendruk, Dophuchen, Tading, Gakiling, Sangbaykha, Uesu, Samar, Samphelling, Samtenling, Dekiling, and Shompangkha Gewogs. Likewise as one of the cash crops, more than 50% HHs producing Potato were from Norbugang, Tading, Uesu, Samar, Bongo, Getana, Metekha, Dungna, and Nichula Gewogs. For Large Cardamom, more than 50% HHs producing were from Tendruk, Dophuchen, Gakiling, Tading, Sangbaykha, Bongo, Getana, Metekha, Dungna and Kana Gewogs. The Gewog wise details for the HHs producing project targeted crops is provided as annex 3 tables 1 and 2.

4.4.2 Productivity of Crops

It has been past experience of the firm that though individual farmers can provide data on the production volume, yet there was difficulty in estimating the exact area under cultivation, especially for vegetables and other crops which are not cultivated at large scale. However, farmers provide exact area under cultivation for Citrus and Cardamom, being the main cash crops. At times, the respondent representing the households are not well acquainted with agricultural farm works and thus estimating the productivity from individual farmers was a challenge. Therefore, community survey method (focus group discussion with a group of farmers cultivating the project targeted crops) in different locations (within Gewog) where farmers gathered for individual interview was applied. The group of farmers discussed and estimated average productivity (Kg/acre) in their Chiwogs (based on the average for last three years) and also estimated the expected productivity under good circumstance. The average from 41 FGDs was obtained for each of the project targeted crops. However, to estimate the area under cultivation for citrus and cardamom, the data was collected from individual farmers.

The productivity for crops are: Paddy (1021 kg/ acre as against the expected productivity of 1406); Potato (2934 Kg/acre as against expected productivity of 3645); citrus (3293 kg/acre as against expected productivity of 5309); Cardamom (145 kg/acre as against expected productivity of 218) and as reflected in table 20 on next page for other crops including vegetables. The total area under Citrus cultivation is estimated as 1140.30 acres and that under Cardamom is 3744.63 acres.

Table 20: Productivity of the project targeted crops

Crops	**Productivity (Kg/Acre)**	**Expected Productivity**
Paddy	1021	1406
Potato	2934	3645
Chili	1545	2014
Cauliflower	1676	2706
Cabbage	2359	3679
Beans	1273	2394
Tomato	1349	2225
Onion	1286	1997
Broccoli	1009	1576
Carrot	1766	2200
Pea	1010	1386
Green leafy Vegetables	1797	2590
Ginger	2100	3836
Black pepper	0	0
Quinoa	224	246
Citrus	3293	5309
Cardamom	145	218

Source: FSAPP Baseline Survey- FGD with Farmers, Oct – Nov 2018, Bhutan Consulting Associates

The command area and the productivity of Paddy for the four irrigation schemes to be supported by the project (under construction) is presented in table 21, which will benefits 964.25 acres of wetland and at present has an average productivity of 1244.75 kg per acre for Paddy. This is higher than average productivity from 24 Gewogs (1021 Kg/acre) as average from 24 Gewogs includes low yielding areas as well. In case of areas to be catered by four irrigation schems, its high paddy yielding areas and at present 273.16 acres out of total command area of 1346 has flood irrigation.

Table 21: Command area and productivity of paddy under four irrigation schemes supported (under construction) by the project

Sl. No.	Name of the channel	Gewog	Command Area (Acres) as per PAD	Wetland Command Area (Acres)	Paddy Productivity (Kg/acre)
1	Birkulo-Samlachen	Dophuchen	50	34	980
2	Tarey Khola	Norbugang	648	540	900
3	Ratey Khola	Dekiling	338	157.74	1409
4	Laring Khola	Gakidling	310	232.51	1690
Total / Average			1346	964.25	1244.75

Source: FSAPP Gewog Agriculture Officer, Nov, 2018

Note: Command Area as per PAD is inclusive of Dryland

4.4.3 Marketed Volume and Marketed Value of the Crops

For each of the project targeted crops, total production was estimated for 100% HHs in the project area (8023 HHs) using the survey data from 30.77% HHs. The percentage of produce marketed out of total produced as estimated by the survey data was applied for the entire population to arrive at exact volume of produce marketed by 8023 HHs in the project area. It was found that the percentage of produce marketed stood as follows: Rice 6%; potato 69%; chilli 42%; cauliflower 59%; cabbage 70%; ginger 80%; citrus 98% cardamom 95%; and other percentages for other crops as shown in table 21 on next page. With regards to the total marketed volume of the project targeted crops in

the year 2017, it was estimated as: rice 130,367.24 kgs; potato 1,353,444.91 Kgs; ginger 390,916.48 Kgs; citrus 103,925.90 Pons; cardamom 321,745.86 Kgs; and for vegetables and other crops as shown in table 22.

Table 22: Percentage of project targeted crop's produce marketed, marketed volume, average market price, and marketed value

Crops	% of Produce Marketed	Total Volume Marketed (Unit kg)	Average Market Price	Total Marketed Value (Nu. In kg)
Paddy	6%	130,367.24	46.67	6,084,399.86
Potato	69%	1,353,444.91	27.51	37,233,269.58
Chili	42%	106,353.59	120.89	12,856,652.94
Cauliflower	59%	62,872.93	40.27	2,531,702.21
Cabbage	70%	220,916.48	29.43	6,501,395.97
Beans	52%	111,771.21	46.38	5,183,450.68
Tomato	56%	36,558.34	27.20	994,489.00
Onion	39%	10,997.73	45.00	494,897.63
Broccoli	36%	14,553.14	43.56	633,913.63
Carrot	49%	47,409.81	28.19	1,336,553.29
Pea	55%	33,756.91	45.12	1,523,152.52
Green leafy vegetables	35%	130,003.25	45.12	5,865,904.22
Ginger	80%	390,916.48	36.34	14,205,539.79
Black pepper	0%	-	-	-
Quinoa	60%	2,385.44	93.67	223,436.25
Citrus (in Pon)	98%	103,925.90	158.69	16,491,741.55
Large Cardamom	95%	321,745.86	592.31	190,574,646.28
Total		**3,077,979.20**	**1,426.34**	**302,735,145.39**
TOTAL VALUE IN MILLION NU.				**302.74**

Source: FSAPP Baseline Household Survey, Oct – Nov 2018, Bhutan Consulting Associates

Similarly, the monetary value of produce marketed was determined based on the marketed volume estimated for 8023 HHs and based on the average market price (average of the selling prices) as obtained from 30.77% HHS during survey. However, for Cardamom, the price is the one in the market as farmers mostly sell Cardamom on their own to the traders in the markets / towns. For other produce, the prices in the prominent markets are higher than the average selling prices. With calculations based on average selling prices, the revenue generated by beneficiary HHs for the year 2017 was as follows: Rice 6.1 million, Potato 37.23 million; chilli 12.85 million; cauliflower 2.5 million; cabbage 6.5 million; citrus 16.49 million; cardamom 190.57 million and others as reflected in table 21. Adding up the revenue generated by all crop, in total Nu. 302.74 million has been the marketed value (revenue generated for the farmers) from the project targeted crops in the year 2017. For details analysis on production volume, marketed volume and marketed value, refer annex 3, tables 3 and 4.

4.5 Farm Settings and Accessibility

4.5.1 Percentages of Land Cultivated

Data was collected from 2469 respondents on total land area owned for both Chuzhing (wetland) and Kamzhing (dry land) and accordingly area cultivated, left fallow, leased in and leased out. The same was summed up (as provided in annex 1, table 8). Based on the summed up data from the respondents, it was found that 70.3% of the Chuzhing owned is cultivated by the rural households but not necessarily with Paddy but with some other crops as well like large Cardamom, vegetables, potato, and millets amongst others. It was found that 24.9% of Chuzhing owned were left fallow and 4.8% were leased out (figure 5 on next page). From 30.77% HHs (2469 HHs), in total 158.4 acres of Chuzhing is leased in by the farmers. With regards to Kamzhing, 79.7% of what is owned was cultivated; 19.3% is left fallow and 0.9% was leased out. Another 219.3 acres of Kamzhing is leased in by 30.77% HHs (2469 HHs).

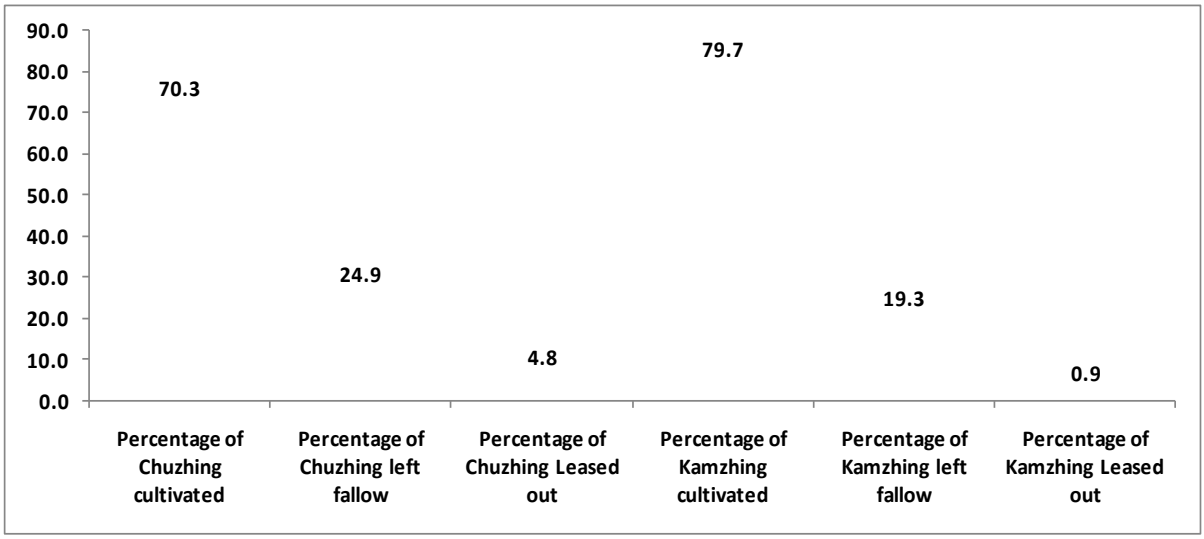

Figure 5: Percentage of land cultivated, left fallow and leased out by types of land
Source: FSAPP Baseline Household Survey, Oct – Nov 2018, Bhutan Consulting Associates

4.5.2 Accessibility to Inputs by Types

The respondents were asked if their respective households had accessibility to required inputs, as and when required by the households. It was found that a highest percentage of HHs (91.6%, i.e. 7350 HHs) has accessibility to improved seeds and seedlings when required (figure 6).

A significant percentage (32.9%, i.e. 2642 HHs) had accessibility to improved packaging materials; followed by 27.5% (2206 HHs) with easy access to credits; 25.6% (2050 HHs) with accessibility to power tillers; 24.3% (1946 HHs) having accessibility to fertilizers; 21% (1683 HHs) having accessibility to sprayers; and 13.9% (1111 HHs) with accessibility to agro processing and value addition facilities mainly the flour and rice mills. A very less number of HHs reported having accessibility to other agricultural inputs such as transplanter, harvester, thresher, dryers and graders. A few HHs (6.6%, i.e. 530 HHs) have accessibility to de-husker, mainly attached to rice mills. All these details along with Dzongkhag-wise analysis on respondent's accessibility to various inputs is provided in annex 1 (table 9).

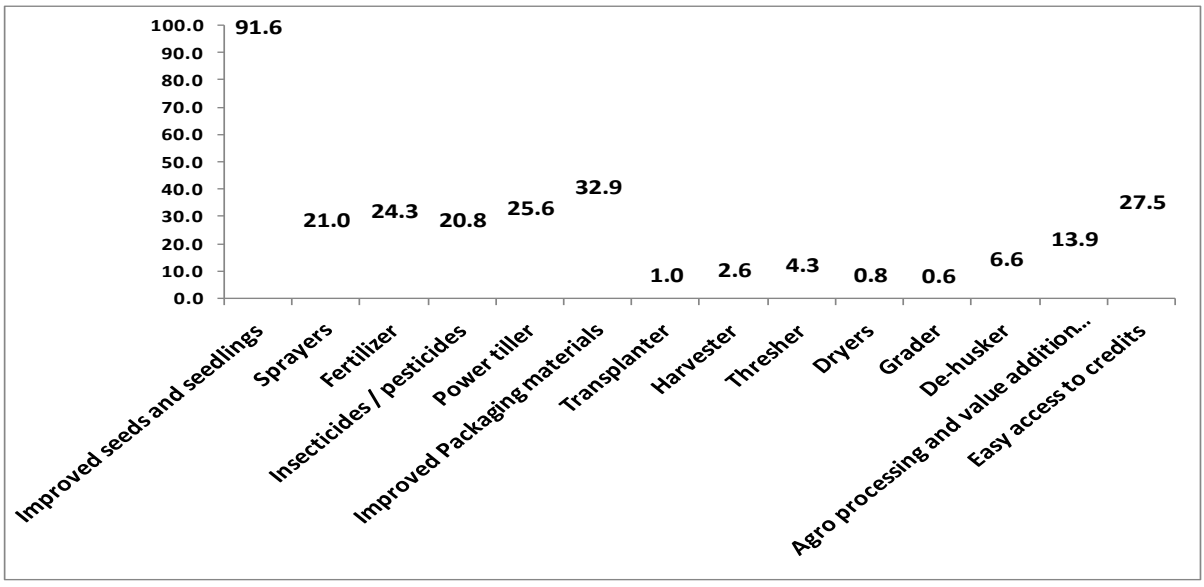

Figure 6: Percentage of households with accessibility to various inputs by types
Source: FSAPP Baseline Household Survey, Oct – Nov 2018, Bhutan Consulting Associates

4.5.3 Accessibility to Irrigation by Types

In an analysis of household's accessibility to irrigation facilities by types (as multiple options), it is noticed that a high percentage of the HHs (61.9%, i.e. 4968 HHs) are dependent on drinking tap water as means of irrigation, mainly for kitchen garden or any smaller scale of vegetable production (figure 7).

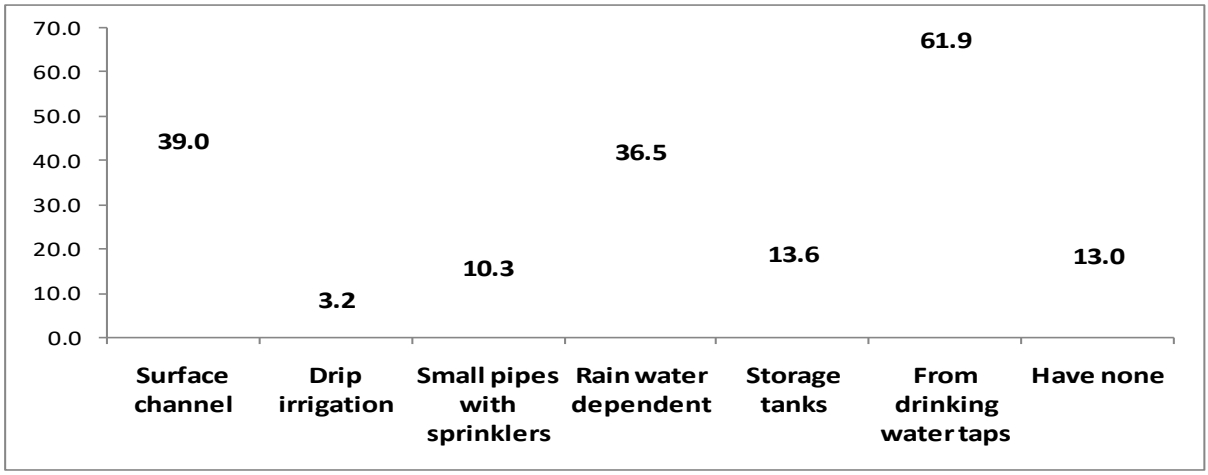

Figure 7: Percentage of households with accessibility to irrigation facilities by types
Source: FSAPP Baseline Household Survey, Oct – Nov 2018, Bhutan Consulting Associates

Another 39% (3125 HHs) reported using surface irrigation; followed by 36.5% HHs (2928 HHs) being rain water dependent; 13.6% (1080 HHs) using water from storage tanks; and 10.3% (829 HHs) using small pipes along with sprinklers (taping water on their own for Cardamom field or using from drinking water taps for vegetables). A few HHs (3.2%, i.e. 260 HHs) also reported using drip irrigation. In all 13 % (1043 HHs) reported having accessibility to none of these irrigation facilities, implying that these HHs are not even rain water dependent and do not use any irrigation water.

The Dzongkhag-wise distribution of the respondents with accessibility to types of irrigation facilities shows that in all Dzongkhags, majority of the HHs (61.93%) are dependent on drinking tap water for irrigation; followed by surface irrigation (39%); rain water dependent (36.49%); and less percentages of HHs with other types as reflected in table 23.

Table 23: Count and percentage of farmer-respondents with accessibility to irrigation facilities by types and by Dzongkhags

Irrigation facilities	**Count and %**	Dzongkhag					Total	
		Samtse	Haa	Ch/kha	Sarpang	Dagana	Count	% of total
Surface channel	Count	185	74	318	109	277	963	39.00
	% in Dzkg	29.7%	23.1%	62.5%	22.5%	52.1%		
Drip irrigation	Count	21	28	22	3	6	80	3.24
	% in Dzkg	3.4%	8.7%	4.3%	0.6%	1.1%		
Small pipes with sprinklers	Count	108	10	20	59	58	255	10.33
	% in Dzkg	17.4%	3.1%	3.9%	12.2%	10.9%		
Rain water dependent	Count	237	72	264	179	149	901	36.49
	% in Dzkg	38.1%	22.4%	51.9%	36.9%	28.0%		
Storage tanks	Count	209	1	44	28	53	335	13.57
	% in Dzkg	33.6%	0.3%	8.6%	5.8%	10.0%		
From drinking water taps	Count	461	163	301	313	291	1529	61.93
	% in Dzkg	74.1%	50.8%	59.1%	64.5%	54.7%		
Have none	Count	27	107	28	119	40	321	13.00
	% in Dzkg	4.3%	33.3%	5.5%	24.5%	7.5%		
	Count	622	321	509	485	532	2469	100.0

Source: FSAPP Baseline Household Survey, Oct – Nov 2018, Bhutan Consulting Associates

A good percentage of HHs (33.6%) from Samtse Dzongkhag reported using storage tanks for irrigation. This is however not any special water harvesting technologies adopted but using simple water tanks, such as drinking water tanks to tap water for irrigation purposes, mainly for kitchen garden vegetable production. Comparatively, Chhukha and Dagana Dzongkhags have substantial percentages of HHs with accessibility to surface irrigation (62.5% in Chhukha and 52.1% in Dagana) as compared to other Dzongkhags. Households being rain water dependent is evident for substantial percentage of HHs from all Dzongkhags as it was reported that even for seasonal Paddy cultivation, HHs are dependent on rain water directly or tapping from temporary streams. The distribution of the respondents with accessibility to irrigation facilities by the types and by the Gewogs is provided in annex 1 (table 10).

4.5.4 Crops Area with Assured Irrigation Facilities

Using e-questionnaires, executed to the Gewog agriculture extension officers (AEOs), area under assured irrigation facilities (flood and micro irrigation) were collected for the project targeted crops, based on the records maintained by the AEOs. In total 7777.9 acres were reported to be under assured flood irrigation for all project targeted crops. Likewise, 1569.2 acres were reported to be under assured micro-irrigation (table 24). However, these areas under assured irrigation facilities are from other interventions and not from project targeted irrigation schemes and micro irrigation (as the baseline is as of Dec 2017 and project activities were implemented starting 2018). The Gewog wise data is provided as annex 4.

Table 24: Area under assured irrigation facilities (flood and micro) and by the project targeted crops

Crops	Assured Area under Irrigation	
	Area under Flood Irrigation (Acres)	Area under Micro Irrigation (Acres)
Paddy	5209.59	68.5
Potato	629	70
Vegetables	357.95	708.8
Large Cardamom	998	218
Citrus	370	410.2
Quinoa	9	0.5
Ginger	204	91.15
Black pepper	0.4	2
	7777.9	**1569.2**

Source: FSAPP Gewog Agriculture Officer, Nov, 2018

4.5.5 Technologies Adopted

Given the multiple options for the households to choose the types of technologies adopted by the households, it was found that majority of the HHs (80.7%, i.e. 6473 HHs out of 8023) apply manure / leaf litter; 67.2% (5388 HHs) undertake crop rotation practice; 62.4% (5007 HHs) use improved seeds and seedlings; 61.7% (4949 HHs) undertake contour farming; and 55.5% (4452 HHs) undertake intercropping as shown in figure 8 on next page. The baseline for technologies such as stone pickers, paddy cutter and drum seeders will remain to be zero as such technologies were not introduced before and its introduced first time in Bhutan by the project.

Amongst other technologies adopted, using compost is done by 19.5% (1566 HHs); Poly houses / shade nets / fencing nets are used by 17.3% (1388 HHs); mulch is practiced by 16.8% (1352 HHs); 15.4% (1232 HHs) have electric fencing to prevent wild animals destroying crops; 15.3% (1225HHs) undertake farm mechanization practices; 14.2% (1137 HHs) use pipes and sprinklers for irrigation; 10.4% (838 HHs) have undertaken terracing of the sloppy land and other smaller percentages of HHs for other technologies adopted (such as cover crop, controlling irrigation seepage and drainage, using drip

irrigation, using water harvesting technologies and using transplanter) as shown in the figure.

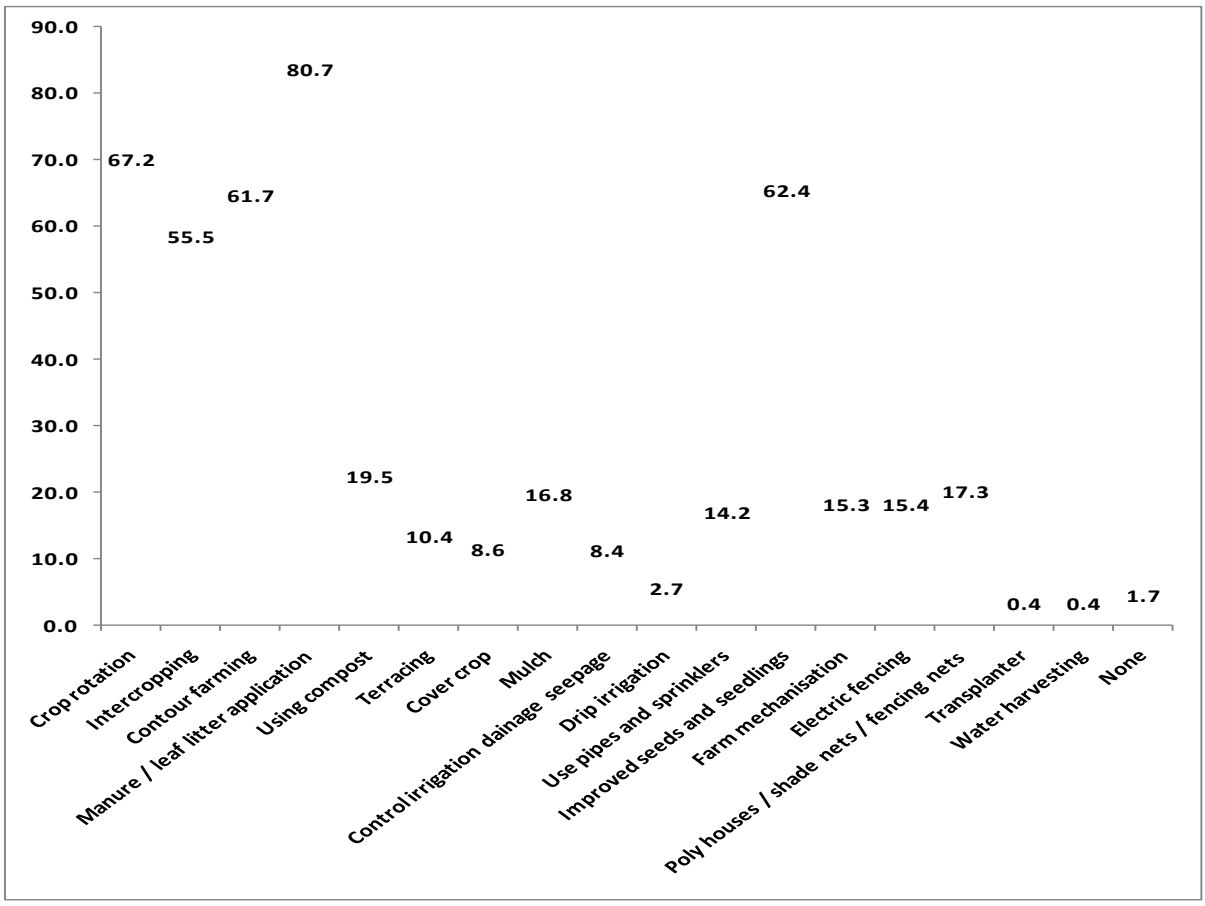

Figure 8: Percentage of households with technologies adopted by types
Source: FSAPP Baseline Household Survey, Oct – Nov 2018, Bhutan Consulting Associates

Except for application of manure / leaf litter, all other technologies are considered as improved technologies. It was found that 180 HHs out of 2469 (7.3% HHs) use manure / leaf litter and 1.7% do not adopt any of the other improved technologies. It is therefore 9% HHs (722 out of 8023) in total for those using manure / leaf litter and those not adopting any technologies. Leaving this 9% aside, remaining 91 % HHs (7301 out of 8023) adopt one or other of the improved technologies. Refer annex 1 (table 11 and 12 for Dzongkhag-wise and Gewog-wise details).

4.6 Markets and Market Information

4.6.1 Accessibility to Marketing Infrastructures

Out of 98 FGs and CooPs, for 56 groups, accessibility to marketing infrastructures is not applicable as they are mostly infrastructures or road or irrigation schemes maintenance and user groups. From remaining 42 groups, 11 have some accessibility to marketing infrastructures (mainly available Sunday markets, small market sheds or towns and few also mentioned selling to auction yard at Food Corporation of Bhutan Limited). Remaining 31 groups reported inaccessibility to any of the marketing infrastructures. The details for each FGs and CooPs is provided in annex 2, table 3.

Analysis on households having marketing equipments and access to marketing infrastructures, revealed that 55.5% HHs (4452 HHs out of 8023) have post harvest handling and packaging equipments (such as crates, simple bags, sacks, poly bags). A good percentage of HHs (19.7%, i.e. 1579 HHs) reported having access to Farm Shops as marketing infrastructures which however is utilised by farmers for purchase of

essential items including agricultural tools. Another 17.6% (1414 HHs) have access to small market sheds (temporary or along the road side or small market sheds in smaller towns) for selling produce. Only 4% (322 HHs) reported having collection or packaging centres; 0.8% (65 HHs) reported having some storage structures; and 29.4% (2362 HHs) does not have access to any of these marketing infrastructures, as reflected in figure 9. In total 70.6% (5664 out of 8023) have access to one or the other types of marketing infrastructure. The Dzongkhag wise and Gewog wise distribution of the respondents with access to various marketing infrastructures is provided in annex 1 (table 13 and table 14 respectively).

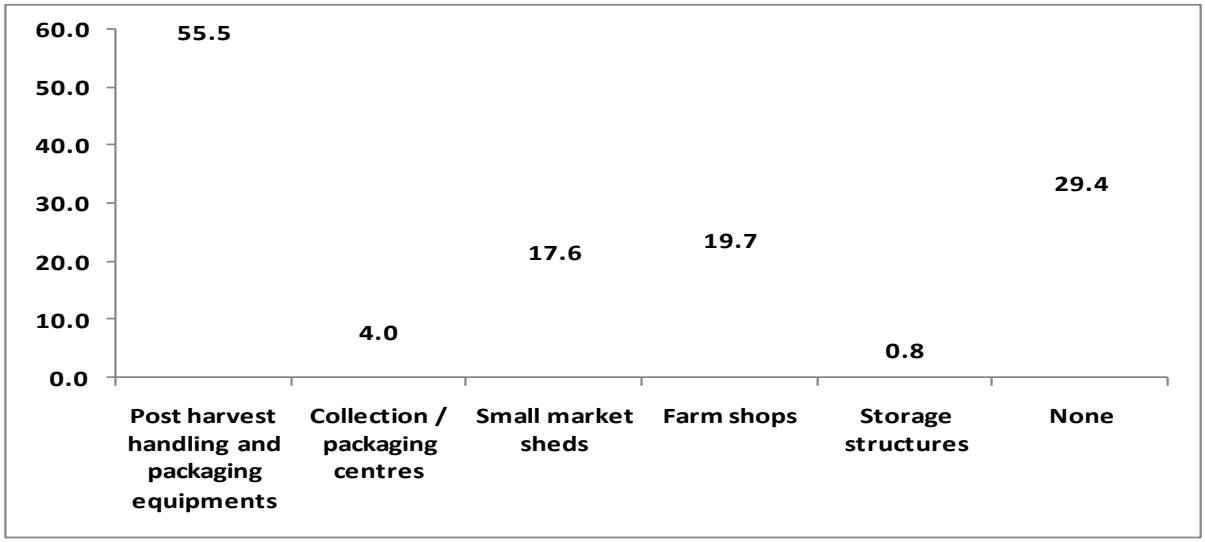

Figure 9: Percentage of households with accessibility to various marketing infrastructures

Source: FSAPP Baseline Household Survey, Oct – Nov 2018, Bhutan Consulting Associates

4.6.2 Most Common Markets

Amongst the most common markets for marketing agricultural produce, as high as 31.9% (2561 HHs) reported selling their produce in permanent market sheds as reflected in table 25. Permanent market shed included the vendor in towns or shop keepers in the towns or the shops across Indian border towns.

Table 25: Count and percentage of farmer-respondents with usual markets for selling agricultural produce by Dzongkhags.

Common markets	**Count and %**	Dzongkhag					Total		Estimate out of 8023 HHs
		Samtse	Haa	Chhukha	Sarpang	Dagana	C	% of total	
Farm shops	Count	9	6	2	16	7	40	1.6	130
	% in Dzkg	1.4	1.9	0.4	3.3	1.3			
Schools / institutions	Count	35	30	131	7	17	220	8.9	715
	% in Dzkg	5.6	9.3	25.7	1.4	3.2			
Farm gate	Count	83	60	75	96	100	414	16.8	1345
	% in Dzkg	13.3	18.7	14.7	19.8	18.8			
Permanent market sheds	Count	265	129	280	65	49	788	31.9	2561
	% in Dzkg	42.6	40.2	55.0	13.4	9.2			
Temporary market sheds	Count	92	1	30	53	33	209	8.5	679
	% in Dzkg	14.8	0.3	5.9	10.9	6.2			
Middlemen	Count	201	53	175	186	317	932	37.7	3029
	% in Dzkg	32.3	16.5	34.4	38.4	59.6			
Auction yards	Count	5	174	90	50	13	332	13.4	1079
	% in Dzkg	0.8	54.2	17.7	10.3	2.4			
Do not market any produce	Count	156	59	63	144	111	533	21.6	1732
	% in Dzkg	25.1	18.4	12.4	29.7	20.9			
Total	Count	622	321	509	485	532	2469	100	

Source: FSAPP Baseline Household Survey, Oct – Nov 2018, Bhutan Consulting Associates

As high as 37.7% (3029 HHs) reported selling directly to middlemen; another 16.8% (1245 HHs) is selling at farm gate itself; 13.4% (1079 HHs) reported selling at auction yards; 8.9% (715 HHs) is selling to schools / institutions; and 8.5% (679 HHs) reported selling to temporary market sheds. There are slight variations amongst the Dzongkhags. Amongst the highest percentages of HHs in each Dzongkhags, 42.6% from Samtse Dzongkhag reported selling at permanent market shed; 54.2% from Haa reported selling at auction yards; 55% from Chhukha is selling at permanent market sheds; and 59.6% from Dagana and a highest of 38.4% from Sarpang reported selling to middlemen. The Gewog wise distribution of the respondents by the types of most common markets is provided in annex 1 (table 15).

4.6.3 Accessibility to Marketing Information

On the account of groups' accessibility to market information, for 56 numbers of groups out of 98, having market information is not applicable owing to their nature of the groups' activities as already mentioned. Out of remaining 42 groups, 19 (i.e. 45.2%) have some access to current market prices; and remaining 23 groups (54.8%) mentioned having no market information accessibility. For these details for each of the FGs and CooPs, refer annex 2, table 3.

Analysis from survey respondents (table 26) reflects that 67.2% (5391 HHs) have access to current market prices for the agricultural produce but of prices in the markets in vicinity or prices in their most common markets; another 46.8% (3753 HHs) have information on trends in market prices; 43.1% (3461 HHs) have knowledge of available markets; but less percentages have information on cost of accessing markets, and on ease of market information.

Table 26: Count and percentage of farmer-respondents with accessibility to market information by types and by Dzongkhags

Market information	**Count and %**	Dzongkhag					Total		Out of 8023 HHs
		Samtse	Haa	C/kha	Sarpang	Dagana	Count	% of total	
Current market prices	Count	459	197	287	344	372	1659	67.2	5391
	% in Dzkg	73.8	61.4	56.4	70.9	69.9			
Trends in market prices	Count	317	168	301	187	182	1155	46.8	3753
	% in Dzkg	51.0	52.3	59.1	38.6	34.2			
Knowledge of available markets	Count	82	176	294	220	293	1065	43.1	3461
	% in Dzkg	13.2	54.8	57.8	45.4	55.1			
Cost of accessing markets	Count	14	46	90	49	29	228	9.2	741
	% in Dzkg	2.3	14.3	17.7	10.1	5.5			
Ease of market information	Count	2	13	9	4	23	51	2.1	166
	% in Dzkg	0.3	4.0	1.8	0.8	4.3			
None	Count	153	62	70	62	32	379	15.4	1232
	% in Dzkg	24.6	19.3	13.8	12.8	6.0			
Total	Count	622	321	509	485	532	2469	100	

Source: FSAPP Baseline Household Survey, Oct – Nov 2018, Bhutan Consulting Associates

The ease of market information was considered as a platform where farmers can easily access and avail the market information. The Gewog wise distribution of the respondents with accessibility to market information by types is provided in annex 1 (table 16).

4.6.4 Sources of Market Information

Peer farmers remain to be the most prevalent source of market information for majority of the households (56.7%, i.e. 4549 HHs); followed by information from traders / middlemen (40.7%, i.e. 3262 HHs); radio / TV for 23.4 % (1862 HHs); social media for 15.9 (1274 HHs); and very less percentages reported getting market information from other sources such as extension officials, interactive voice response, Department of Agricultural Marketing and Cooperatives (DAMC) website, and newspapers, as shown in figure 10 on next page. The Dzongkhag wise and Gewog wise distribution of respondents

and accordingly analysis with the sources of market information by types are provided in annex 1 (tables 17 and 18 respectively).

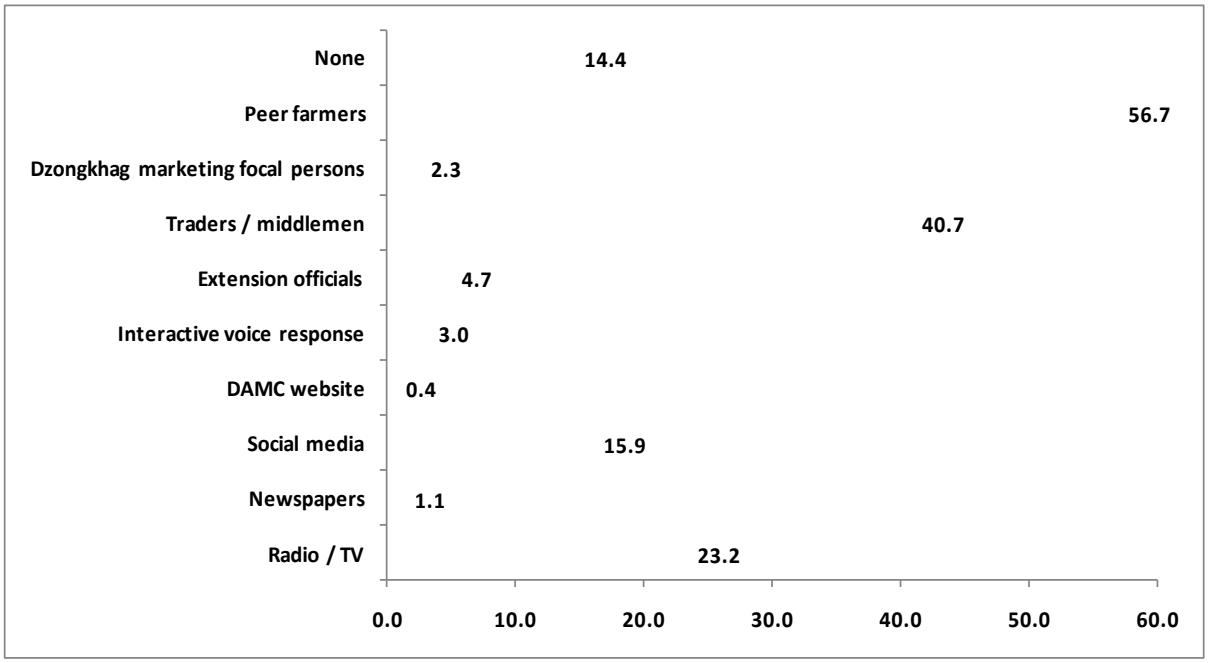

Figure 10: Percentage of households with sources of market information by types
Source: FSAPP Baseline Household Survey, Oct – Nov 2018, Bhutan Consulting Associates

As learnt from FGDs with farmers, those residing closer to markets / towns/ border towns are more aware of the current market prices and also the trends in market prices. These HHs often visit weekend markets and are better informed of the market prices. For those HHs located far off and having less mobility to the markets, rely basically on the peer farmers and the traders / middlemen to get informed of the current market prices (if at all need arises to know the prices). Few also mentioned of knowing such prices from national radio and from auction yards (for those who visit them to sell cash crops).

4.6.5 Linkages to Schools / Institutions for Marketing Produce

Analysis based on the survey revealed that till December 2017, not a single household as the member of the farmers groups were linked to schools / institutions for regular supply of vegetables. While 91.9% (7373 HHs) reported not linked to schools, another 8.1% (650 HHs) reported being linked to schools for supply of vegetables but as individual farmers and not as the member of any groups (table 27). As the project activities started in 2018, till December 2017, no farmers groups were linked to schools / institutions for regular supply of vegetables / fruits.

Table 27: Count and percentage of farmer-respondents linked to schools / institutions for regular supply of vegetables

Linked to schools / institutions	**Count and %**	Dzongkhag					Total
		Samtse	Haa	Ch/kha	Sarpang	Dagana	
Yes (as member)	Count	0	0	0	0	0	0
	% in Dzkg	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
No (not a member also)	Count	590	300	421	452	505	2268
	% in Dzkg	94.9%	93.5%	82.7%	93.2%	94.9%	91.9%
Supply as individual farmer	Count	32	21	88	33	27	201
	% in Dzkg	5.1%	6.5%	17.3%	6.8%	5.1%	8.1%
Total	Count	622	321	509	485	532	2469

Source: FSAPP Baseline Household Survey, Oct – Nov 2018, Bhutan Consulting Associates

4.7 Food Security

4.7.1 Overall Food Sufficiency

On analysing the food sufficiency for the households for 12 months consumption (be it produced from own farm or purchased food commodities), 100% (8023 HHs) indicated having enough food for 12 months consumption. There were no single households reporting food insufficiency. Though households may not produce enough from own farm, but manage food from other income sources. The survey had questionnaire to look at number of months with food insufficiency and with names of the months, but with 100% HHs reporting food self sufficiency for 12 months consumption, these remained invalid.

4.7.2 Food Surplus and Shortage from Own Farm Production

In another analysis regarding the households producing surplus food commodities from own farm, apart from sufficiency for 12 months consumption, it revealed that as high as 51.9% HHs (4163 HHs) indicated not producing surplus of any of the major commodities (i.e. Rice, Potato, Maize, Fruits and nuts, and Vegetables). Out of 8023 HHs, 22.6% (1813 HHs) produced surplus fruits and nuts. This is as the varieties of fruits are grown in all seasons and fruits are not regularly consumed or regularly purchased from outside by the rural households. Another 16.8% (1349 HHs) produced surplus vegetables as there are customary practices to dry the vegetables and store for lean season consumption. Amongst others, 8.8% (708 HHs) produced surplus rice from own farm; 8.4% (676 HHs) produce surplus Maize; and 7.9% (637 HHs) produce surplus Potato after having sufficiency for 12 months households' consumption (table 28).

Table 28: Count and percentage of farmer-respondents indicating food commodities produced in surplus from own farm by Dzongkhags

Major Food Commodity	**Count and %**	Dzongkhag					Total		Total out of 8023
		Samtse	Haa	C/kha	Sarpang	Dagana	C	%	
Rice	Count	88	22	22	35	51	218	8.8	708
	% in Dzkg	14.1	6.9	4.3	7.2	9.6			
Potato	Count	26	142	15	9	4	196	7.9	637
	% in Dzkg	4.2	44.2	2.9	1.9	0.8			
Maize	Count	115	17	29	22	25	208	8.4	676
	% in Dzkg	18.5	5.3	5.7	4.5	4.7			
Fruits and nuts	Count	69	5	19	212	253	558	22.6	1813
	% in Dzkg	11.1	1.6	3.7	43.7	47.6			
Vegetables	Count	94	44	102	99	76	415	16.8	1349
	% in Dzkg	15.1	13.7	20.0	20.4	14.3			
None	Count	362	146	359	203	211	1281	51.9	4163
	% in Dzkg	58.2	45.5	70.5	41.9	39.7			
Total	Count	622	321	509	485	532	2469	100	8023

Source: FSAPP Baseline Household Survey, Oct – Nov 2018, Bhutan Consulting Associates

Though only few households indicated producing surplus of the major commodities, in another analysis households not producing enough of major commodities from own farm for 12 months consumption revealed that though HHs do not produce surplus, yet some still produced enough to last for 12 months household's consumption. In all, 64.4% (5170 HHs) indicated not producing enough Paddy from own farm to last for 12 months consumption (table 29 on next page). Other food shortages from own farm are Vegetables for 56.9% HHs; Potato for 56.7% HHs; Fruits and Nuts for 56.1% HHs; and Maize for 53.8% HHs reflecting household's food insecurity.

However, there is variation amongst the Dzongkhags. While majority of the HHs from Samtse, Haa, and Chhukha indicated not producing enough Paddy, comparatively lesser percentages of HHs from Sarpang and Dagana indicated the same as seen in the table. This indicates majority of the HHs under Sarpang and Dagana cultivate Paddy. The same

scenario holds for Potato, Maize, Fruits and nuts, and Vegetables. In all, 56.9% (4566 HHs) do not produce sufficient Vegetables; 56.7% (4553 HHs) do not produce enough Potato; 56.1% (4504) do not produce enough Fruits and Nuts; and 53.8% (4319 HHs) do not produce sufficient Maize from own farm, as reflected in table 29.

Table 29: Count and percentage of farmer-respondents indicating food commodities insufficient for 12 months consumption (from own farm production) and by Dzongkhags

Food commodity	**Count and %**	Dzongkhag					Total		Total out of 8023
		Samtse	Haa	C/kha	S/pang	Dagana	C	%	
Rice	Count	511	299	476	135	170	1591	64.4	5170
	% in Dzkg	82.2	93.1	93.5	27.8	32.0			
Potato	Count	577	182	478	84	80	1401	56.7	4553
	% in Dzkg	92.8	56.7	93.9	17.3	15.0			
Maize	Count	486	303	464	54	22	1329	53.8	4319
	% in Dzkg	78.1	94.4	91.2	11.1	4.1			
Fruits and nuts	Count	531	314	476	44	21	1386	56.1	4504
	% in Dzkg	85.4	97.8	93.5	9.1	3.9			
Vegetables	Count	502	282	394	119	108	1405	56.9	4566
	% in Dzkg	80.7	87.9	77.4	24.5	20.3			
None	Count	19	0	12	265	306	602	24.4	1956
	% in Dzkg	3.1	0.0	2.4	54.6	57.5			
Total	Count	622	321	509	485	532	2469	100	8023

Source: FSAPP Baseline Household Survey, Oct – Nov 2018, Bhutan Consulting Associates

The food surpluses and shortages from own farm segregated by gender of the household (with percentage within the gender of the household heads) shows no significant differences between the households headed by males and females (table 30). If 9.7% of males headed households produced surplus rice, 7.1% of female headed households also produced it; for potato 5.4% male headed HHs and 12.8% females headed households produced surplus; for maize (10.5% males headed: 4.5% female headed); for fruits and nuts (24.7% males headed: 18.5% female headed); and for vegetables it's almost the same percentages of households. Likewise, amongst the households having rice shortage from own farm, it was 63.6% male headed households and 66.1% of female headed households; for potato (58.6% male headed: 53.2% female headed); for maize (50.6% males: 60.1% females); fruits and nuts (53.5% males: 61.3% females); and for vegetables (23.7% male headed HHs: 19.5% female headed HHs).

Table 30: Count and percentage of household heads indicating food commodities surpluses and shortages produced from own farm

Major Food Commodity	Count and Percent	**Surplus Produced**		Total	**Shortage**		Total
		Gender of the HH head			Gender of the HH head		
		Male	Female		Male	Female	
Rice	Count	158	60	218	1031	560	1591
	% within HH Heads	9.7%	7.1%	8.8%	63.6%	66.1%	64.4%
Potato	Count	88	108	196	950	451	1401
	% within HH Heads	5.4%	12.8%	7.9%	58.6%	53.2%	56.7%
Maize	Count	170	38	208	820	509	1329
	% within HH Heads	10.5%	4.5%	8.4%	50.6%	60.1%	53.8%
Fruits and nuts	Count	401	157	558	867	519	1386
	% within HH Heads	24.7%	18.5%	22.6%	53.5%	61.3%	56.1%
Vegetables	Count	274	141	415	384	165	549
	% within HH Heads	16.9%	16.6%	16.8%	23.7%	19.5%	22.2%
None	Count	843	438	1281	377	225	602
	% within HH Heads	52.0%	51.7%	51.9%	23.2%	26.6%	24.4%
Total	Count	1622	847	2469	1622	847	2469
	% total	100	100		100	100	

Source: FSAPP Baseline Household Survey, Oct – Nov 2018, Bhutan Consulting Associates

Comparing the HHs with surplus and shortage by the major commodities, for rice 8.8% HHs produce in surplus, while 64.4% have shortage not lasting for 12 months; for potato (7.9% produce in surplus: 56.7% have shortage); maize (8.4% produce in surplus; 53.8% have shortage); fruits and nuts (22.6% produce in surplus; 56.1% have shortage); and vegetables (16.8% produce in surplus; 22.2% have shortage). In total 51.9% HHs do not produce any of these commodities in surplus, and on the other hand 24.4% HHs do not have shortage of any these commodities (table 30).

4.8 Nutritional Status of Farmers and School Children

4.8.1 Literature Review

Diet consumption as per 2012 National Health Survey

The National Health Survey (2012) found that 45% of the population aged 10-75 years consumed fruits, on average of 3.4 days, in a normal week. The mean number of days of fruit consumption in a normal week ranged from 3.3 days for men to 3.6 days for women, and from 3.6 days among urban residents to 3.3 days among rural residents. The survey also found that 94.4% of the population aged 10-75 years consumed vegetables, on average of 4.8 days, in a normal week. There was no difference in the mean number of days of vegetable consumption between males and females, while urban residents consumed vegetables on average of 5.1 days compared to 4.8 days by their rural counterparts.

Diet and Food Security as per 2015 National Nutrition Survey

The National Nutrition Survey (2015) observed that rural households consumed less diverse diets than urban households, and diets that are less rich in iron and micronutrients. According to the WFP Food Consumption Score (FCS) index 8% of households in Bhutan had a "poor" or "borderline" diet. Further, it was observed that low food consumption scores are correlated with wealth as the poorest group has 14% of households consuming a "poor" or "borderline" diet, and only 1% in the wealthiest quintile. Rural households and households in the Eastern region have lower than average FCS, with 10% of households in each area with "poor" or "borderline" diets. The percentage of households suffering food insecurity, including food shortages is extremely low and is found to occur only in households in exceptional circumstances (2% of households).

According to the dietary diversity patterns, starchy staples were the most consumed food group with the average household eating staple foods 7 days/week. The staples most commonly consumed in the country include rice, wheat, potatoes, and sweet potatoes. Fats and oils were the second most frequently eaten food group with households consuming in on average 6.7 days/week. The miscellaneous category of foods includes drinks like tea and coffee and was also widely consumed.

Urban residents consumed diverse diets compared to rural residents. Among the food groups most infrequently consumed include the four meat food groups: organ meats, small and large fish and flesh foods. Flesh foods were eaten on average only 1.5 days per week on average. The low consumption of meat was fairly consistent among rural and urban populations, and across the different regions

Nutritional Status as per 2010 Bhutan Multiple Indicator Survey

Table 31 on next page shows percentages of children classified into each of three categories, based on the anthropometric measurements that were taken during fieldwork for Bhutan Multiple Indicator Survey 2010. Children whose weight-for-age is more than two standard deviations below the median of the reference population are considered moderately or severely underweight, while those whose weight-for-age is more than three standard deviations below the median are classified as severely underweight. In the five Dzongkhags, Haa had the lowest percentage of children who were moderately or severely underweight while Chhukha had the highest (14.1%).

Table 31: Percentage of children under age 5 by nutritional status according to three anthropometric indices: weight for age, height for age, and weight for height, in 5 FSAPP Dzongkhags

Dzongkhag	Weight for age:	Weight for age:	Height for age:	Height for age:	Weight for height:	Weight for height:	Weight for height:
	% below -2 sd [1]	% below -3 sd [2]	% below -2 sd [3]	% below -3 sd [4]	% below -2 sd [5]	% below -3 sd [6]	% above +2 sd
Chhukha	14.1	3.3	27.4	6.4	10.9	2.2	2.4
Dagana	12.4	2.1	29.0	10.3	5.5	1.7	5.1
Haa	9.8	1.4	30.6	10.7	3.3	.4	4.8
Samtse	13.1	2.0	28.4	7.5	4.7	1.5	2.3
Sarpang	10.9	1.0	23.2	6.4	4.4	1.8	5.0

Source: 2010 Bhutan Multiple Indicator Survey

Height-for-age is a measure of linear growth. Children whose height-for-age is more than two standard deviations below the median of the reference population are considered short for their age and are classified as moderately or severely stunted. Those whose height-for-age is more than three standard deviations below the median are classified as severely stunted. Stunting is a reflection of chronic malnutrition as a result of failure to receive adequate nutrition over a long period and recurrent or chronic illness. The percentage of moderately or severely stunted children ranged from 23.2% (Sarpang) to 30.6% (Haa).

Finally, children whose weight-for-height is more than two standard deviations below the median of the reference population are classified as moderately or severely wasted, while those who fall more than three standard deviations below the median are classified as severely wasted. Wasting is a reflection of acute malnutrition usually the result of a recent nutritional deficiency. The indicator may exhibit significant seasonal shifts associated with changes in the availability of food or disease prevalence. The percentage of moderately or severely wasted children ranged from 3.3% (Haa) to 10.9% (Chhukha).

4.8.2 Household Dietary Diversity

In order to obtain information on household dietary diversity, a question was asked: "Did any member of your household eat any of these food items in the last 24 hrs?" Information collected pertains to 24 hours recall period, which is, starting yesterday morning till waking up today morning. Using this data, the Household Dietary Diversity Score (HDDS) was obtained from a number of 12 food groups (Cereals, White roots and Tubers; Dark green leafy vegetables; Vitamin A rich vegetables, tubers and fruits; Other vegetables and fruits; Organ meat; Fresh meat, fish and sea food; Eggs; Legumes, nuts and seeds; and milk and milk products). The response of these 12 food groups were transformed into dichotomous value of "0" and "1". The code "1" was given to those who consumed the food and "0" otherwise. Then, the HDDS was calculated adding the number of each food group consumed by the household. The value varies between 0 through the maximum of 12 (table 31). In order to assess the improvements of food security, comparing the level of dietary diversity is necessary and crucial. However, there have been no established cut-off points to indicate adequate or inadequate dietary diversity for the HDDS. Nonetheless, research elsewhere has established the target score by taking the average of 33% of the households with bigger HDDS. Therefore, three level thresholds is generated: 1) Low dietary diversity (1-6 food groups); 2) Medium dietary diversity (7-8 food groups); and 3) High dietary diversity (9-12 food groups). At the same time, the average HDDS indicator was calculated to make comparison between the populations.

With regards to food consumption pattern, it was found that not more than 5.6% of the households consumed 11 or 12 food groups; while 7.8% consumed 9 groups and 12.3%

consumed 5 and less food groups. The majority (74.3%) consumed between 6 to 9 foods groups (table 32).

Table 32: Food consumption pattern of the households (%) by number of consumed foods

HDDS	Number	Percent
2	6	0.1
3	82	1.0
4	290	3.6
5	624	7.6
6	1,216	14.9
7	1,787	21.9
8	1,798	22.0
9	1,263	15.5
10	640	7.8
11	302	3.7
12	151	1.9
Total	8,157	100

Source: FSAPP Baseline Household Survey, Oct – Nov 2018, Bhutan Consulting Associates

The most consumed food groups by the households were cereals (99%), followed by Vitamin A rich vegetables and tubers/ Dark green leafy vegetables/ other vegetables (96.7%), Spices, condiments and beverages (96.5%) and Oils and fats (90.2%). Similarly, as reflected in table 33.

Table 33: Food consumption pattern of the households (%) by consumed food groups

Food Group No.	Food Groups	Number of Response	Percent of Cases
1	Cereals	2,445	99.0
2	White roots and tubers	1,329	53.8
3	Vegetables	2,387	96.7
4	Fruits	1,285	52.1
5	Meat	898	36.4
6	Eggs	709	28.7
7	Fish and Sea foods	305	12.4
8	Legumes, nuts and seeds	1,227	49.7
9	Milk and milk products	1,916	77.6
10	Oils and fats	2,226	90.2
11	Sweets	1,541	62.4
12	Spices, condiments and beverages	2,382	96.5
	Total Responses[11]	18,650	
	Total Cases/Respondents	2,469	

Source: FSAPP Baseline Household Survey, Oct – Nov 2018, Bhutan Consulting Associates

Note: The vegetable food group is a combination of vitamin A rich vegetables and tubers, dark green leafy vegetables and other vegetables. The fruit group is a combination of vitamin A rich fruits and other fruits. The meat group is a combination of organ meat and flesh meat.

In all the Dzongkhags, four major food groups were consumed by over nine-tenth of the households respectively. These food groups are cereals, vegetables, oils and fats, and spices, condiments and beverages. Fish and sea foods were the least consumed with percentage of households ranging between 8% and 20%. More than 50% of the households consumed legumes, nuts and seeds, except for Haa (29.4%) and Dagana

[11] The respondents were given the choice to state one or more sources of food groups (multiple choices). The total cases/respondents are usually less than the actual response in multiple response analysis. This means that respondents have reported more than just one option. If we divide total number of responses by total respondents, we get 7.5. It means that on average a respondent has opted 7.5 food groups that they have consumed with in the 24 hours.

(46.1%), while meat consumption was reported by less than 50% of the households in all the surveyed Dzongkhags. Percentage of households with food groups consumed by the Gewogs and the Dzongkhags is provided in annex 5, table 1.

Although there is not much difference between male and female headed households in terms of consumed food groups with both consuming about 7.5 food groups, though some pattern in the consumption can be deduced. Generally, male-headed households consumes slightly more of white roots and tubers, fish and sea foods, eggs, and milk and milk products compared to female-headed households; whereas, female-headed households consumes more Vitamin A rich fruits/other fruits, milk and milk products, and sweets than their male counterparts. Remaining food groups were consumed almost in equal proportion, for instance, cereals are consumed by 98.6% and 99.8% of the male and female headed households respectively as shown in the table 34. The fish and sea foods, eggs, and organ meat/ fresh meat were consumed the least.

Table 34: Percentage of households consuming various food groups by gender of the household head

Food Groups	**Male**	**Female**
Cereals	98.6	99.8
White roots and tubers	58.1	45.5
Vitamin A rich vegetables and tubers/Dark green leafy vegetables/other vegetables	97.0	96.1
Vitamin A rich fruits/other fruits	49.9	56.4
Organ meat/Fresh meat	36.4	36.4
Eggs	26.6	32.9
Fish and Sea foods	13.0	11.1
Legumes, nuts and seeds	54.0	41.3
Milk and milk products	75.9	80.9
Oils and fats	90.5	89.5
Sweets	60.4	66.4
Spices, condiments and beverages	96.3	96.9
Total Responses	**12,271**	**6,378**
Total Cases/Respondents	**1,622**	**847**

Source: FSAPP Baseline Household Survey, Oct – Nov 2018, Bhutan Consulting Associates

The Household Dietary Diversity Score (HDDS), using the method as specified in earlier section (i.e. from a number of 12 food groups and three level thresholds) is generated as follows: 1) Low dietary diversity (1-6 food groups); 2) Medium dietary diversity (7-8 food groups); and 3) High dietary diversity (9-12 food groups). In overall, about 44% of the households have a medium dietary diversity, while 27.2% and 28.9% of the households have low and high food diversity respectively (table 35).

Table 35: Percentage of Households with dietary diversity levels

Dietary diversity levels	Number	Percent
Low food diversity	2,217	27.2
Medium food diversity	3,584	43.9
High food diversity	2,356	28.9
Total	8,157	100.0

Source: FSAPP Baseline Household Survey, Oct – Nov 2018, Bhutan Consulting Associates

Similarly, it was found that the mean HDDS stood at 7.6, which is within the middle HDDS level. This means that there is no difference in dietary diversity between male-headed and female-headed households (table 36).

Table 36: Mean and median household dietary diversity by gender of the household head

Sex of HH Head	**Mean**	**Median**
Male	7.6	8.0
Female	7.5	8.0
Total	7.6	8.0

Source: FSAPP Baseline Household Survey, Oct – Nov 2018, Bhutan Consulting Associates

Even by Dzongkhags, households consuming no. 11 (Sweets) and no. 12 (spices, condiments and beverages) food groups were comparatively less with percentage ranging between as low as 0.2% to 8%. Similarly, households consuming food groups below 5 were minimal in all the surveyed Dzongkhags. Generally, the most consumed food groups were nos. 6, 7, 8, and 9 (Eggs; Fish and sea foods; legumes, nuts and seeds; and milk and milk products) accounting for more than 60% of the households. The household dietary diversity score by the food groups segregated by the Gewogs and the Dzongkhags is provided in annex 5, table 2.

4.8.3 Students Dietary Diversity

The Individual Dietary Diversity Score (IDDS) was constructed from a number of 14 food groups (Cereals; white roots and tubers; vitamin A rich vegetables; Dark green leafy vegetables; other vegetables; Vitamin A rich fruits; other fruits; Organ meats; fresh meats; Eggs; Fish and sea foods; Legumes, nuts and seeds; Milk and milk products; and oils and fats). Dichotomous variable was created for the responses of the 14 food groups: Those who reported food consumption was coded "1" and "0" for otherwise. Finally, the number of each food groups was summed together to form IDDS. Using the list of food items, the question "what was consumed in last 24 hours i.e. starting yesterday morning till waking up this morning" was asked to the students to arrive at IDDS.

The result shows that most of the boarding students (30%, i.e. 1286 students out of total 4287 boarding students) consume 6 or 8 food groups each; 20% (857) consumes 9 food groups; 10% (429) consumes 10 food groups; and another 10% consumes 11 food groups as shown in table 37.

Table 37: Food consumption pattern of boarding students (%) by no. of consumed foods and by schools

	Individual Dietary Diversity Score (IDDS)					
Schools	6	8	9	10	11	**Total**
Bongo Primary School	0.0	100.0	0.0	0.0	0.0	100.0
Dorokha Central School	0.0	0.0	0.0	100.0	0.0	100.0
Drujeygang Central School	0.0	0.0	0.0	0.0	100.0	100.0
Dungna Lower Secondary School	100.0	0.0	0.0	0.0	0.0	100.0
Gyenkhana Primary School	100.0	0.0	0.0	0.0	0.0	100.0
Lhamoizingkha Central School	0.0	0.0	100.0	0.0	0.0	100.0
Pakshikha Central School	0.0	100.0	0.0	0.0	0.0	100.0
Rangtse Primary School	0.0	0.0	100.0	0.0	0.0	100.0
Sengdhyen Lower Secondary School	100.0	0.0	0.0	0.0	0.0	100.0
Tendruk Central School	0.0	100.0	0.0	0.0	0.0	100.0
Total	30.0	30.0	20.0	10.0	10.0	100.0

Source: FSAPP Baseline School Survey, Oct – Nov 2018, Bhutan Consulting Associates

It was found that all the boarding students consume cereals, tubers, oils, and legume, nuts and seeds (Dried beans, dried peas, lentils, nuts, seeds), followed by other vegetables (90%, i.e. 3858), leafy vegetables (80%, i.e. 3429), milk and milk products (70%, 3001), and vitamin A rich vegetables (60%, 2572). None of the schools provided vitamin A rich fruits, organ meats, and fish and sea foods to the students. The Food Consumption Pattern of Boarding Students (%) by Consumed Food Groups, and by Schools is provided in annex 5, table 3.

For day scholar students, the result shows that only few consumed more than 10 food groups. Those who consumed 11, 12 and 13 food groups accounted for 4.3%, 1.6%, and 0.8% respectively (table 38 on next page). On the other hand, only about 7% have consumed less than 6 food groups; however, there were no students who consumed less than 3 food groups. This shows that most of them consumed 6 to 10 food groups, which totalled to 85.5% (3492 out of total 4084). Similar pattern of consumption has been reported among the surveyed Dzongkhags. The detail on Food Consumption Pattern of

the Days scholars (%) by Number Consumed Foods, and by Dzongkhag / Gewogs in annex 5, table 4.

Table 38: Food consumption pattern of the day scholar students (%) by number of consumed foods

IDDS	Male	Female	Total
3	0.0	0.6	0.3
4	1.1	3.5	2.3
5	4.9	3.8	4.3
6	13.1	14.8	14.0
7	20.3	20.4	20.3
8	25.9	21.0	23.4
9	17.5	17.4	17.5
10	9.8	12.8	11.3
11	5.0	3.5	4.3
12	1.0	2.3	1.6
13	1.5	0.0	0.8
Total	100.0	100.0	100.0

Source: FSAPP Baseline School Survey, Oct – Nov 2018, Bhutan Consulting Associates

It was found that most of the day scholar students consume cereals (98.4%, 4019 students), oils (97.3%, 3974), and other vegetables (92.1%, 3761). The least consumed food was organ meats (7.6%, 310), and fish (11.8%, 482) which includes fresh fish and dried fish (table 39).

Table 39: Food consumption pattern of the day scholar students (%) by consumed food groups

Food Group No	Food Groups	Male	Female	Total
1	Cereals	97.4	99.5	98.4
2	Tubers	84.7	86.9	85.8
3	Vitamin A rich vegetables	48.2	44.6	46.4
4	Leafy vegetables	67.3	65.0	66.2
5	Other Vegetables	92.3	91.9	92.1
6	Vitamin A rich fruits	26.2	25.0	25.6
7	Other Fruits	68.5	72.4	70.5
8	Organ meats	10.7	4.5	7.6
9	Meat	37.4	25.3	31.3
10	Eggs	26.7	24.6	25.6
11	Fresh fish and dried fish	11.5	12.1	11.8
12	Legumes, nuts and seeds	63.8	59.9	61.8
13	Milk	67.8	74.2	71.0
14	Oils	95.6	99.0	97.3

Source: FSAPP Baseline School Survey, Oct – Nov 2018, Bhutan Consulting Associates

In addition, Eggs, vitamin A rich fruits, and meat were also consumed at minimum level. By sex, in terms of the top three consumed food groups (cereals, oils, and other vegetables), the proportion of males (92.3%) who reported consuming 'other vegetables' was marginally higher than females (91.9%); whereas 'cereals' and 'oil' consumption was slightly higher for females than males. The proportion of males who consumed 'organ meats' was more than twice that of females. Among the Dzongkhags, similar consumption pattern is reflected with majority consuming cereals, oils, other vegetables, and the least 'organ meats'. The detail on Food Consumption Pattern of the Day scholars (%) by Consumed Food Groups, and by Dzongkhag /Gewog is provided in annex 5, table 5.

The proportion of students who have consumed plant foods rich in vitamin A (85.2%, 3480 students) was higher than those who consumed animal foods rich with vitamin A (79.3%, 3239), and it was more than two-times that of students consuming iron rich foods (39.3%, 1605). Females consumed more animal rich foods compared to males who consumed more of plant food rich in vitamin A and iron rich foods (table 40).

Table 40: Percentage of day scholars consuming vitamin A and iron rich foods

Nutrition Foods		Male	Female	Total
Plant Foods rich in Vitamin A	No	12.1	17.6	14.9
	Yes	87.9	82.4	85.2
Animal Foods rich in Vitamin A	No	22.5	18.9	20.7
	Yes	77.5	81.2	79.3
Iron rich foods	No	56.0	65.4	60.7
	Yes	44.0	34.6	39.3
	Total	100.0	100.0	100.0

Source: FSAPP Baseline School Survey, Oct – Nov 2018, Bhutan Consulting Associates

On an average, students consume 8 food groups with mean IDDS of 8 for males and 7.8 for females. Even among the Dzongkhags, the mean IDDS is almost same except for Dagana with 8.5. Overall, indicating high dietary diversity among the students (table 41).

Table 41: Mean individual dietary diversity score for students by gender and Dzongkhag

IDDS	
Sex/Dzongkhag	**Mean**
Male	8.0
Female	7.8
Chhukha	7.3
Dagana	8.5
Haa	7.3
Samtse	7.8
Total	**7.9**

Source: FSAPP Baseline School Survey, Oct – Nov 2018, Bhutan Consulting Associates

4.8.4 Servings and Nutritional Counselling /Techniques

The question "Till last year, how many servings of fruits and vegetables (but not potato) were served to you in a day?" was asked to the day-scholar students. One serving was considered as one Bhutanese size cup of either vegetables or fruits weighing approximately 125 grams. The day scholar students are sample based. However, for boarding students, they were represented by a group of boarding students (six numbers in each school) and mess in-charge because all the boarding students are served from the common kitchen and common pot. Therefore, the food consumed is same for all students. At least 46.6% (1,356 out of total 2922 students from 10 surveyed schools) reported three servings of fruits and vegetables in a day, followed by two (20.7%, i.e. 606 nos) and four (20.3%, i.e. 594). Not more than 5.7% reported one serving per day, while five and more serving accounted for less than 7% (i.e. 132 reported 5 servings and 68 reported more than 5 servings) as shown in table 42. There is no significant difference between the percentages of males and females with number of servings.

Table 42: Percentage of day scholar students according to the number of servings of fruits and vegetables by schools

	Male		**Female**		**Both Sex**	
No. of servings	**Number**	**%**	**Number**	**%**	**Number**	**%**
1	94	6.5	72	4.9	166	5.7
2	336	23.1	270	18.4	606	20.7
3	625	42.9	731	49.9	1356	46.4
4	303	20.8	291	19.9	594	20.3
5	60	4.1	72	4.9	132	4.5
More than 5	39	2.7	29	2.0	68	2.3
Total	1457	100.0	1465	100	2922	100

Source: FSAPP Baseline School Survey, Oct – Nov 2018, Bhutan Consulting Associates

In the case of boarding students, a group of students from 10 selected schools were interviewed and the data was validated by the mess in-charges. Since all the students are served from common pot and kitchen, the number of servings is considered same for all the boarding students. Therefore, based on the 2017 Annual Education Statistics, the

boarding students were allocated under "number of servings" depending on the response made by their respective school mess-in-charge. There were a total of 3757 boarding students from 10 surveyed schools. Most of the mess-in-charge (n=5) reported three servings per day followed by four servings (reported by 3 mess-in-charge), which corresponded to 45.6% (1715 nos) and 40% (1501) of the total students respectively. Only the mess-in-charge of Bongo Primary School reported two serving per day, corresponding to 38 boarding students. Likewise, Tendruk Central School reported 5 servings per day (503 boarding students. i.e. 13.4% of total) as shown in table 43.

Table 43: No. of boarding students according to the number of servings of fruits and vegetables by schools

	Number of Servings						
School Name	**1**	**2**	**3**	**4**	**5**	**>5**	**Total**
Bongo Primary School	0	38	0	0	0	0	38
Dorokha Central School	0	0	0	503	0	0	503
Drujeygang Central School	0	0	0	686	0	0	686
Dungna Lower Secondary School	0	0	292	0	0	0	292
Gyenkhana Primary School	0	0	184	0	0	0	184
Lhamoizingkha Central School	0	0	0	312	0	0	312
Pakshikha Central School	0	0	712	0	0	0	712
Rangtse Primary School	0	0	141	0	0	0	141
Sengdhyen Lower Sechool	0	0	386	0	0	0	386
Tendruk Central School	0	0	0	0	503	0	503
Total (Number)	0	38	1715	1501	503	0	3757
Total (Percent)	0.0	1.0	45.6	40.0	13.4	0.0	100.0

Source: FSAPP Baseline School Survey, Oct – Nov 2018, Bhutan Consulting Associates

Of the total 6679 students from 10 surveyed schools students, adding up day scholars and boarding students that reported 5 or more servings (132+68+503), 703 students (10.5% out of total 6679 students) have received 5 or more than 5 servings of fruits and vegetable per day with recall period of 24 hours and considering one servings as one small cup approximately of 125 grams. The proportion of boarder students (13.4%,) who have had 5 or more servings per day was slightly more than two times higher than that of day-scholar students (6.8%) as shown in table 44.

Table 44: Number and percentage of students with a minimum of recommended 5 servings of fruits and vegetables per day

Student	**Total Students**	**Number**	**%**
Day scholars	2922	200	6.8
Boarding	3757	503	13.4
Both	6679	703	10.5

Source: FSAPP Baseline School Survey, Oct – Nov 2018, Bhutan Consulting Associates

The respondents (farmers) were asked if they received any nutritional counselling or education advising on appropriate food intake, vitamin A and micro-nutrients supplements. It was found that 77.4% (i.e. 6210 HHs out of 8023) have received such counselling and education; and another 22.6% (1813 HHs) have not received, as presented in table 45.

Table 45: Percentage of farmer-respondents that received nutritional counselling and advising by Dzongkhags.

Indication	Count and Percent	Dzongkhag					Total
		Samtse	Haa	Chhukha	Sarpang	Dagana	
Yes	Count	301	286	447	426	451	1911
	% in Dzkg	48.4%	89.1%	87.8%	87.8%	84.8%	77.4%
No	Count	321	35	62	59	81	558
	% in Dzkg	51.6%	10.9%	12.2%	12.2%	15.2%	22.6%
Total	Count	622	321	509	485	532	2469

Source: FSAPP Baseline Household Survey, Oct – Nov 2018, Bhutan Consulting Associates

On analysis the sources of receiving the above counselling / advising by the farmers, as high as 53.9% received it from health personals from the Gewogs; followed by media (for 28.4%); village health workers (22.5%); Gewog extension officers (12.3%) and school health coordinators (11.6%). This shows that some of the respondents representing the households were educated ones, who have attended schools in the past (table 46).

Table 46: Percentage of farmer-respondents indicating the sources of nutritional counselling and advising by Dzongkhags.

From whom	Count	Dzongkhag					Total	%
		S/tse	Haa	C/kha	S/pang	D/gana		
Personals from school agriculture program	Count	6	6	5	10	13	40	1.6
Gewog Extension Officers	Count	46	20	71	94	73	304	12.3
Health personals from the Gewog	Count	204	181	338	303	306	1332	53.9
Village health workers	Count	104	89	154	66	142	555	22.5
School health coordinator	Count	18	64	167	13	24	286	11.6
School counselors	Count	9	10	31	15	6	71	2.9
Media	Count	46	214	217	135	90	702	28.4
Have not received	Count	320	35	62	60	80	557	22.6
Parents/ family members	Count	11	1	3	7	2	24	1.0
Total	Count	622	321	509	485	532	2469	100

Source: FSAPP Baseline Household Survey, Oct – Nov 2018, Bhutan Consulting Associates

Looking at the frequency of counselling for rural HHs, for higher percentage of HHs (43.9%), it was irregular with no appropriate time intervals; and with some time intervals for others as presented in table 47.

Table 47: Frequency and percentage of farmer-respondents by the frequency of nutritional counselling and by Dzongkhags.

Frequency of counseling	Dzongkhag					Total	%
	Samtse	Haa	Chhukha	Sarpang	Dagana		
Once every three months	64	29	64	45	94	296	12.0
Once every six months	36	5	10	62	108	221	9.0
Once a year	44	30	10	92	99	275	11.1
Once every two years	9	1	1	0	3	14	0.6
Once every three years	2	1	2	0	15	20	0.8
Irregular	146	219	360	226	133	1084	43.9
Have not received	321	36	62	60	80	559	22.6
Total	622	321	509	485	532	2469	100

Source: FSAPP Baseline Household Survey, Oct – Nov 2018, Bhutan Consulting Associates

With regards to any nutritional counselling / education advising on appropriate food intake received by the boarding school mess in-charges or cooks and the students, it shows that 70% of the mess in-charges / cooks and 90% (i.e. 3858 students) of the boarding students have received nutritional counselling in the past one year (table 48).

Table 48: Percentage of mess in-charges / cooks and boarding students having received nutritional counselling

Counseling Received by Mess In-Charges / Cooks		
Counseling Received	Number	Percent
Yes	7	70.0
No	3	30.0
Total	10	100.0

Counseling Received by Boarding Students		
Counseling Received	Number	Percent
Yes	9	100.0
No	1	0.0
Total	10	100.0

Source: FSAPP Baseline School Survey, Oct – Nov 2018, Bhutan Consulting Associates

In general, school health counsellor (60%) came out as the main source of nutritional counselling for them. The second main source was their 'parents'/family members' with over 40% stating this source of nutritional counselling. Other sources included personals from school agriculture programme (30%), health personals from Gewogs (30%), and

media (20%). Not more than 10% of the students reported 'school counsellor' as their source of counselling that they received. It was found that gewog extension officer and village health worker did not make the list of sources as none of the respondents opted for these two options (table 49).

Table 49: Percentage of boarding students with sources of nutritional counselling

Source of Counselling	**Responses**	**Percent**
Personals from School Agriculture Programme	3	30.0
Gewog Extension Officers	0	0.0
Health Personals from Gewog	3	30.0
Village Health Workers	0	0.0
School Health Coordinator	6	60.0
School Counsellors	1	10.0
Media	2	20.0
Not received such counselling	1	10.0
Parents/Family members	4	40.0
Total Responses	20	
Total Respondents	10	

Source: FSAPP Baseline School Survey, Oct – Nov 2018, Bhutan Consulting Associates

When asked about the number of times such counselling /education received on nutrition and diets, the majority (60%) reported that they received it on irregular basis with no appropriate time interval. Boarding students who did not received such counselling accounted for 10%. There are also others with 10% each indicating either having received such counselling once every three months; or once every six months; or once a year as shown in table 50.

Table 50: Percentage of boarding students by frequency of nutritional counselling

No. of counseling	**Number**	**Percent**
Once every three months	1	10.0
Once every six months	1	10.0
Once a year	1	10.0
Once every two years	0	0.0
Once every three years	0	0.0
Irregular with no appropriate time interval	6	60.0
Have not received such counseling/education	1	10.0
Total	**10**	**100.0**

Source: FSAPP Baseline School Survey, Oct – Nov 2018, Bhutan Consulting Associates

When Day scholar students were asked whether they have received any nutritional counselling/education advising on appropriate food intake (balanced diet), or vitamin A and micro-nutrients supplements, the vast majority (83.5%, i.e. 3410 students) reported that they have received such counselling in the past on year (table 51). More females (88.9%) have received the counselling than their male (78.1%) counterparts

Table 51: Percentage of day scholar students having received nutritional counselling

Counseling Received	Male	Female	Both Sex
Yes	78.1	88.9	83.5
No	22.0	11.1	16.5
Total	100.0	100.0	100.0

Source: FSAPP Baseline School Survey, Oct – Nov 2018, Bhutan Consulting Associates

With regards to sources of receiving such counselling, slightly over half (51.6%) of the day-scholar students have received nutrition counselling from school health coordinator, with proportion higher among the female students (56.2%) than males (47%). The next common source mentioned were parents/family members (34.2%), school counsellors (28.6%), media (10.7%), and health personals from Gewogs (9.9%). In all these four sources, there were higher proportions of female students who have received the counselling compared to that of male students. Gewog extension officers, personnels

from school agriculture programme, and village health worker were the least mentioned sources of counselling (table 52).

Table 52: Percentage of day scholar students with sources of nutritional counselling

Sources of Counselling	Male	Female	Total
Personnels from School Agriculture Programme	0.4	1.9	1.2
Gewog Extension Officers	0.4	0.0	0.2
Health Personals from Gewogs	8.1	11.7	9.9
Village Health Workers	5.0	7.5	6.3
School Health Coordinator	47.0	56.2	51.6
School Counsellors	21.9	35.2	28.6
Media	7.3	14.0	10.7
Not received such counselling	22.0	11.1	16.5
Parents/Family members	30.7	37.7	34.2
Total Responses	285	353	638
Total Respondents	199	201	401

Source: FSAPP Baseline School Survey, Oct – Nov 2018, Bhutan Consulting Associates

Overall, 56.1% of the day scholars' students reported that they have received the nutritional counselling/education on an irregular basis without appropriate time interval (mentioned by 53% males and 59.2% females). About 13% have received every three months, while 7.9% once a year (table 53).

Table 53: Percentage of boarding students by frequency of nutritional counselling

frequency	**Male**	**Female**	**Total**
Once every three months	13.0	13.1	13.1
Once every six months	4.1	6.0	5.1
Once a year	6.1	9.7	7.9
Once every two years	0.0	0.4	0.2
Once every three years	0.4	0.4	0.4
Irregular with no appropriate time interval	53.0	59.2	56.1
Have not received such counseling/education	23.4	11.1	16.5
Total	100.0	100.0	100.0

Source: FSAPP Baseline School Survey, Oct – Nov 2018, Bhutan Consulting Associates

Analysis on number of respondents (farmers) that received nutrition relevant techniques and support towards them showed that only 6.4% (513 HHs) have not received any nutritional relevant techniques. Therefore remaining 93.6% (i.e. 7510 HHs) have received various nutritional relevant techniques as reflected in the table 54.

Table 54: Percentage of farmer-respondents by types of nutritional techniques received and by Dzongkhags.

Techniques	Count and Percent	Dzongkhag					Total and %
		Samtse	Haa	Chhukha	Sarpang	Dagana	
Hand washing	Count	318	277	450	391	421	1857
	% in Dzkg	24.5%	23.4%	26.0%	24.9%	23.6%	24.6%
Safe storage of food	Count	227	177	256	280	321	1261
	% in Dzkg	17.5%	14.9%	14.8%	17.8%	18.0%	16.7%
Awareness on food diversity	Count	119	210	262	285	318	1194
	% in Dzkg	9.2%	17.7%	15.1%	18.2%	17.9%	15.8%
General knowledge in nutrition and behaviour	Count	59	133	178	126	170	666
	% in Dzkg	4.6%	11.2%	10.3%	8.0%	9.5%	8.8%
Food diversity	Count	255	139	267	237	240	1138
	% in Dzkg	19.7%	11.7%	15.4%	15.1%	13.5%	15%
Dietary habits	Count	39	217	279	192	238	965
	% in Dzkg	3.0%	18.3%	16.1%	12.2%	13.4%	12.8%
None	Count	279	31	41	59	73	483
	% in Dzkg	21.5%	2.6%	2.4%	3.8%	4.1%	6.4%
Total	Count	1296	1184	1733	1570	1781	7564

Source: FSAPP Baseline Household Survey, Oct – Nov 2018, Bhutan Consulting Associates

It is found that all the boarding students including mess in-charges and cooks have received nutritional relevant techniques and awareness till last year. While all indicated having received techniques for hand washing, a good percentage also mentioned having received techniques for others as reflected in table 55.

Table 55: Percentage of mess in-charges / cooks who received nutritional techniques and awareness

Techniques	No. of Responses	Percent Cases
Hand washing	10	100.0
Safe storage of food items	6	60.0
Awareness of food safety	8	80.0
General knowledge in nutrition and behavior	7	70.0
Food diversification	8	80.0
Dietary habits	6	60.0
None of the above	0	0.0
Total Responses	45	
Total Respondents/Cases	10	

Source: FSAPP Baseline School Survey, Oct – Nov 2018, Bhutan Consulting Associates

In case of boarding students, while all received techniques on hand washing, only 20% (857 students) indicated having received techniques on safe storage of food; 40% (1715) received general awareness on food safety; 30% (1286) on general knowledge in nutrition and behaviour; and 60% (2572) each for food diversity and dietary habits (table 56).

Table 56: Percentage of boarding students with nutritional techniques and awareness

Techniques	No. of Responses	Percent Cases
Hand washing	10	100.0
Safe storage of food items	2	20.0
Awareness of food safety	4	40.0
General knowledge in nutrition and behavior	3	30.0
Food diversification	6	60.0
Dietary habits	6	60.0
None of the above	0	0.0
Total Responses	31	
Total Respondents/Cases	10	

Source: FSAPP Baseline School Survey, Oct – Nov 2018, Bhutan Consulting Associates

In case of day scholar students, all the students reported having received hand washing technique till last year, followed by safe storage of food items (71.4%, 2916 students), and awareness of food safety (41.5%, 1695). The proportion of women (75.9%) who received 'safe storage of food items' was higher compared to males (66.8%). None of them had any knowledge or awareness about the dietary habits (table 57).

Table 57: Percentage of day scholar students who received nutritional techniques and awareness

Techniques	Male	Female	Total
Hand washing	100.0	100.0	100.0
Safe storage of food items	66.8	75.9	71.4
Awareness of food safety	40.0	43.0	41.5
General knowledge in nutrition and behavior	23.4	23.2	23.3
Food diversification	14.3	13.0	13.7
Dietary habits	0.0	0.0	0.0
None of the above	0.0	0.0	0.0
Total responses	488	514	1002
Total respondents	200	201	401

Source: FSAPP Baseline School Survey, Oct – Nov 2018, Bhutan Consulting Associates

Majority of the households (farmers) indicated not consuming ready-to-made therapeutic food on regular basis (57.5%, i.e. 4613 HHs out of 8023). Remaining 42.5% (3410 HHs)

were regularly consuming one or the other of ready-to-made therapeutic foods in their households (table 58).

Table 58: Percentage of households who regularly consume ready-to-made therapeutic foods by Dzongkhags

Therapeutic Food Intake	Count & Percent	Dzongkhag					Total
		Samtse	Haa	Chhukha	Sarpang	Dagana	
Yes	Count	168	221	328	169	163	1049
	% in Dzkg	27.0%	68.8%	64.4%	34.8%	30.6%	42.5%
No	Count	454	100	181	316	369	1420
	% in Dzkg	73.0%	31.2%	35.6%	65.2%	69.4%	57.5%
Total	Count	622	321	509	485	532	2469

Source: FSAPP Baseline Household Survey, Oct – Nov 2018, Bhutan Consulting Associates

With regards to ready-to-made therapeutic food consumption, it was found that boarding students were not served with therapeutic foods, micro-nutrients and vitamin a supplements (table 59). However, mess in-charges mentioned that they regularly give vitamin A tablets and de-worming tablets to the students (both boarding and day scholars). In case of day scholar students, more than half (54.1%, 2209) of the students have not consumed any ready to made therapeutic foods, micro-nutrients and vitamin A supplements. The proportion of students consuming such supplements (45.9%, 1875) was higher among females (51.4%) than males (40.4%).

Table 59: Percentage of boarding and day scholar students regularly consuming therapeutic foods, micronutrients and vitamin A supplements

Boarding Students				Day Scholar Students			
Option	**Number**	**Percent**			Male	Female	Total
Yes	0	0.0		Yes	40.4	51.4	45.9
No	10	100.0		No	59.6	48.7	54.1
Total	10	100.0		Total	100.0	100.0	100.0

Source: FSAPP Baseline School Survey, Oct – Nov 2018, Bhutan Consulting Associates

4.8.5 Summary from Nutritional Availability, Awareness and Practices Survey Report conducted by Tarayan Foundation

A study on Nutritional Availability, Awareness and Practices Survey for capacity development and communication for improved nutrition outcomes in rural households' for SAFANSI project by Tarayana Foundation was conducted in October 2018, in one Chiwog (Thongsa-Tobchenthang) under Tading Gewog in Samtse Dzongkhag. The summaries of key findings are:

- The main driver of change is cash income. Increased income has led to changes in all aspects of livelihood, health and education.
- The main change agents in the areas are health workers, agriculture extension, teachers, and ECCD care givers. ECCD care givers and teachers have the best opportunity to bring positive changes in the food habits of the children while health workers are most effective in mother and child care, sanitation and hygiene.
- Though wage labour provides income to maximum number of households, crops, livestock and betel leaf show good potential both engaging increased households and annual income.
- Food is most important expenses both in terms of number of households involved and average annual expenditure.
- The food production is very limited both in terms of varieties that the households grow and the production.
- Four most grown vegetables are chillies (110 HHs), Sag/mustard green (79 HHs) pumpkin (61 HHs) and beans (51 HHs) out of 26 potential vegetables.

- Food security is a serious concern. Own production is still important source of food followed by purchased food. The surveyed households face food shortage during the months of March, April, May and June.
- The food consumption pattern at the time of survey showed that the households consume all the food groups during the week previous to survey.
- The majority of the respondents had adequate knowledge on nutrition.
- The majority of the households (84%) have improved houses with CGI roofs and separate rooms for different uses that can lead to improved sanitation and hygiene.
- Firewood is the predominant fuel used by the communities though three other fuels are also used. Firewood is still the preferred fuel wood.
- Water supply, hand washing and use of toilets are common among majority of the households surveyed. The hand washing and use of improved toilets are dependent on availability of water.
- Though 34 of the 38 respondents reported availing services from BHU during the pregnancy, only 1 out of 38 respondents reported completing the recommended 8 ANC visits. Maximum of 6 respondents out of 38 reported visiting the BHU three times.
- Knowledge on mothers' health during pregnancy is also limited. Maximum of 18 out of 38 respondents are aware of the food and nutrition requirements.
- Majority of the respondents reported that they do not take nutrition supplements. Of the 38 respondents, 12 take iron tablets, 10 take folic acid, 21 take calcium lactate and 10 take vitamin C.
- Majority of the respondents did not undergo health check-up as prescribed. Of the 38 respondents, 13 reported checking blood pressure, 18 reported having blood tested, 19 urine test, 15 weight check and 13 had ultrasound.
- The findings on ANC indicate poor attendance by pregnant women and do not make mandatory 8 visits during the pregnancy.
- Pregnant women and mothers of young children are fully aware of the child feeding practices and follow the practices except for the feeding of drinks and liquids to children aged 6 months and below. Many feed with plain water followed by fresh milk and instant formula.
- Majority of the children are delivered in the health centres. Many mothers are not fully aware of the health checks and supplements provided while they have received counselling on these.
- The mothers are fully aware of the PNC and avail the services. This is most probably due to the fact majority of the children are delivered at the health centres.

4.9 Gender Concerns

4.9.1 Participants for Trainings and Demonstrations

On gender concerns regarding usually participating members from the households for agricultural and extension trainings and demonstrations, it was found that almost equal percentages of the HHs indicated either male or female as most common persons

attending the trainings from the households (i.e. 22.4% indicated mostly females; and 24.3% indicated as mostly males) as reflected in table 60.

Table 60: Count and percentage of farmer-respondents indicating usually participating members from the household for agricultural trainings and by Dzongkhags

Gender	**Count and %**	Dzongkhag					Total	Total out of 8023
		S/tse	Haa	C/kha	S/pang	D/gana		
Females	Count	63	130	150	85	124	552	
	% in Dzkg	10.1%	40.5%	29.5%	17.5%	23.3%	22.4%	1797
Males	Count	127	42	118	146	169	602	
	% in Dzkg	20.4%	13.1%	23.2%	30.1%	31.8%	24.3%	1950
Equally by males and females	Count	46	53	86	99	68	352	
	% in Dzkg	7.4%	16.5%	16.9%	20.4%	12.8%	14.3%	1147
Did not avail any trainings	Count	386	96	155	155	171	963	
	% in Dzkg	62.1%	29.9%	30.5%	32.0%	32.1%	39.0%	3129
Total	Count	622	321	509	485	532	2469	8023

Source: FSAPP Baseline Household Survey, Oct – Nov 2018, Bhutan Consulting Associates

There are also significant numbers of households indicating that such trainings are participated equally by males and females from the HHs (14.3%). As high as 39% (3129 HHs) mentioned that they have not availed any of the agriculture related trainings / awareness / demonstrations in recent past till December 2017.

4.9.2 Households Members for Farm Works

In an analysis regarding member of the households that mostly undertake farm works, for 51.8% (4156 HHs) farm works are undertaken equally by males and females in the households (table 61). Another 26.7% (2142 HHs) mentioned it's mostly by females, while 18.6% (1492 HHs) mentioned it's mostly by males.

Table 61: Count and percentage of farmer-respondents indicating members usually undertake farm works in the household and by Dzongkhags

Gender	**Count and %**	Dzongkhag					Total	Total out of 8023
		S/tse	Haa	C/kha	S/pang	D/gana		
Females	Count	145	124	141	109	141	660	
	% in Dzkg	23.3%	38.6%	27.7%	22.5%	26.5%	26.7%	2142
Males	Count	122	31	55	122	127	457	0
	% in Dzkg	19.6%	9.7%	10.8%	25.2%	23.9%	18.6%	1492
Equally by females and males	Count	332	149	306	245	248	1280	0
	% in Dzkg	53.4%	46.4%	60.1%	50.5%	46.6%	51.8%	4156
Don't know	Count	23	17	7	9	16	72	0
	% in Dzkg	3.7%	5.3%	1.4%	1.9%	3.0%	2.9%	233
Total	Count	622	321	509	485	532	2469	8023

Source: FSAPP Baseline Household Survey, Oct – Nov 2018, Bhutan Consulting Associates

4.9.3 Decision Making

In any decision making related to agriculture and household affairs, 49.5% (3971 HHs) indicated its mostly by the male, who is also the head of the family; another 23.1% (1853 HHs) mentioned its mostly by females, who is also the head of the family; and another significant percentage (22.6%, i.e. 1813 HHs) mentioned its jointly by all the adult members in the households (table 62 on next page). Except for Haa Dzongkhag where higher percentage of HHs (40.2%) indicated decision making is mostly by females, in rest of the Dzongkhags, higher percentage of HHs mentioned it's mostly by males.

Table 62: Count and percentage of farmer-respondents indicating decision making members in the household and by Dzongkhags

Decision making person	**Count and %**	Dzongkhag					Total	Total out of 8023
		Samtse	Haa	C/kha	S/pang	Dagana		
Male (as head	Count	425	87	227	242	240	1221	

of the HH)	% in Dzkg	68.3%	27.1%	44.6%	49.9%	45.1%	49.5%	3971
Female (as head of the HH)	Count	101	129	132	76	133	571	
	% in Dzkg	16.2%	40.2%	25.9%	15.7%	25.0%	23.1%	1853
Other female in the HH	Count	10	10	9	12	13	54	
	% in Dzkg	1.6%	3.1%	1.8%	2.5%	2.4%	2.2%	177
Other male in the HH	Count	8	3	7	22	24	64	
	% in Dzkg	1.3%	0.9%	1.4%	4.5%	4.5%	2.6%	209
Together by all members	Count	78	92	134	133	122	559	
	% in Dzkg	12.5%	28.7%	26.3%	27.4%	22.9%	22.6%	1813
Total	Count	622	321	509	485	532	2469	8023

Source: FSAPP Baseline Household Survey, Oct – Nov 2018, Bhutan Consulting Associates

4.9.4 Feminization in Agriculture

To look at any increased workload for females in the households for agriculture, all the respondents were asked if there has been increasing pressure and increased workload for females in the households in recent years. Majority of the households (65.9%, i.e. 5287 HHs) felt that the workload has not increased for females in the households (table 62). Though 11.8% (947 HHs) remained neutral stating they "don't know", another 22.3% (1789 HHs) stated that there has been increasing pressure and workload for females. While majority of the HHs in all Dzongkhags indicated the workload has not increased, highest percentages of HHs mentioning the same were from Samtse and Sarpang Dzongkhags as compared to others (table 63).

Table 63: Count and percentage of farmer-respondents indicating increased workload for females in the households for agricultural works and by Dzongkhags

Increased Workload in agriculture	**Count and %**	Dzongkhag					Total	Total out of 8023
		Samtse	Haa	C/kha	Sarpang	Dagana		
No	Count	516	184	315	341	271	1627	
	% in Dzkg	83.0%	57.3%	61.9%	70.3%	50.9%	65.9%	5287
Don't know	Count	7	44	90	28	123	292	
	% in Dzkg	1.1%	13.7%	17.7%	5.8%	23.1%	11.8%	947
Yes	Count	99	93	104	116	138	550	
	% in Dzkg	15.9%	29.0%	20.4%	23.9%	25.9%	22.3%	1789
Total	Count	622	321	509	485	532	2469	8023

Source: FSAPP Baseline Household Survey, Oct – Nov 2018, Bhutan Consulting Associates

On analysing the reasons for increased workload for females in agriculture from 550 respondents that indicated it, it was found that the highest percentage of HHs (69.3%) felt its owing to more men being engaged in off-farm activities as compared to females; another 50.4% expressed that its owing to social factor wherein females are required to stay back in rural households to take care of children and parents; 18.5% mentioned its usually more men as compared to females for rural-urban migration for any reasons; 13.8% felt men migrate out more than females owing to higher wages provided for males as compared to females; and 8.4% mentioned males need to migrate out to earn owing to food insufficiency in the households. For details on Dzongkhag wise analysis, refer annex 1, table 19.

Majority of the women in FGD expressed that workload for women in agriculture have decreased over the year. Women no longer are required to fetch firewood or spend more time in cooking as most of them use rice cooker these days. They also save time with drinking water being at door step and need not fetch from streams / pond or river as in the past. With mobility and road available, carrying loads has been a distant memory. With all these, more time were saved and could depute time comfortably for whatever agricultural works. Many mentioned agricultural works are done equally by males and females. With agro-mills in the villages, women do not have to thrash Paddy or de-husk it or grind maize or millets like in the past. Moreover, most of the land has been used for cultivation of cash crops such as Arecanut or Cardamom and time to be deputed by the

women in the households for these crops are comparatively lesser as most of the works are done by males (mostly in southern Dzongkhags).

On the other hand, there were also few of the women expressing increased workload, mainly with households more dependent on women and males often migrating out for other income opportunities. Some felt with intensified vegetable production for the markets (in small scale, though not in large scale) has increased the workload. This is intensified, if women have more children and have to take care of them (cooking, feeding, house chores, cleaning, washing amongst others). With all children enrolled in schools and with inadequate labour in the households, women have taken up agricultural works which in past were mostly done by males such as digging and preparing land using spades, paddy thrashing, and even working equally with males in Cardamom cultivation (mostly prevalent in northern Dzongkhags).

With less exposure, it was observed that **recommending specific crops** and relating it to its actual benefits were very difficult, for the women farmers to express. Despite some of the crops that were of interest to them like: Lentils, split pulses, Chickpea (channa), Hazelnuts, Avocado, Mushroom, Asparagus, Agar trees, Arecanut, Coffee, and Turmeric. However, as mentioned they had no absolute idea on their cultivation except for Arecanut, mushroom, and Turmeric as for these few crops, they had experiences in cultivation or have either seen in person.

4.10 Present Agricultural Constraints and Expectations

4.10.1 Constraints

Looking at the existing agricultural constrains, majority of the households indicated crop damages by wild animals as most common challenge (76.8% HHs); followed by pests, diseases and weeds for 70.4% HHs; lack of irrigation facilities for 54.9% HHs; inadequate labour in the households for 43% HHs; inadequate availability of inputs for 41% HHs; unavailability of market for the produce as indicated by 37.3% HHs; and several others with significant percentage of HHs as shown in table 64. The Dzongkhag wise count of the respondents by the types of constraints is provided in annex 1, table 20.

Table 64: Count and percentage of households by types of agricultural constraints

Constraints	Percentage	Estimate out of 8023 HHs
Inadequate labour	43.0	3451
Marginal land holdings	11.7	942
Poor soil fertility	21.9	1758
Pests, diseases and weeds	70.4	5651
Lack irrigation facilities	54.9	4403
High production costs	7.9	630
Inadequate availability of inputs	41.0	3288
Insufficient seeds and seedlings	9.1	728
Unavailability of markets	37.3	2993
Cheaper produce from India	12.9	1037
Expected prices not fetched	37.1	2977
Crops damage by wild animals	76.8	6164
Farm mechanization impossible	17.8	1427
Lack skill on post harvest and processing	22.2	1777
Inadequate incentive for agriculture	16.2	1300
Inaccessibility (roads)	9.4	751
Don't know	3.2	260

Source: FSAPP Baseline Household Survey, Oct – Nov 2018, Bhutan Consulting Associates

Apart from what were already tapped and recorded above, farmers in FGDs additionally mentioned the following constraints:

- Lack of fruiting of grains owing to pests

- Fluctuating yield in Cardamom and drying (disease most probably) giving insecurity to the farmers
- Don't own oxen and not available on hire on time and seasonally when required from neighbours.
- Price monopoly by the Indian traders mainly for the cash crops (when have to sell directly to them across the border – mostly Cardamom).
- Land prone to landslides.
- Heavy rain during summer causing flash flood and erosions.
- Harsh climatic conditions and frequent disaster like windstorm and hail storm and occurring of landslide due to heavy rainfall.
- Lack proper market linkage or market information.

For females, drudgery is associated with transplantation of Paddy, wedding, cutting paddy, thrashing paddy, making paddy ridges; digging using spades, breaking soil bowls, carrying manure, carrying produce to markets; working in Cardamom fields equally with males. For males, drudgery associated with agriculture was: ploughing using oxen (many expressed despite having power tillers in the Gewog centre, hiring rates are high and rather prefer using oxen); carrying loads; guarding crops against wild animals at night; working in Cardamom field; and making Paddy ridges.

4.10.2 Expectation of Farmers

Some of the expectations of the farmers (in their perspectives) from the project, to overcome challenges facing farmers, assimilated from FGDs are the followings:

- Support more of agro-processing equipments such as rice flake making machines so that two seasonal Paddy can be cultivated and flakes to be marketed to bring additional income to the HHs. Similarly mustard expeller can boost mustard cultivation.
- Paddy being main staple crop, small machineries such as thresher, transplanter and harvester can overcome challenges associated with inadequate labour in the HHs,
- There is a need to explore good technologies to control pests and diseases and disseminate the same,
- As farmers have marginal land holding, good terracing technology and support is required so that irrigation can also be effective,
- Intensify the support towards supply of green houses and there is requirement to supply more improved seeds and seedlings,
- Farmers need to be given more of exposure trips to new technologies,
- Measures are needed to curb problems of wild animals destroying the crops. Mass electric fencing may help.
- Given the low soil fertility, need for appropriate technologies to improve it were also mentioned by farmers,
- Small farm mechanisation machineries to the HHs on subsidies (such as mini power tiller, weeders, thresher etc) would be more beneficial than having larger ones like the power tiller in the Gewogs,
- Promote use of chicken manure and support farmers on the same as prices are comparatively low,
- Intensify vegetable cultivation through existing support on supply of irrigation pipes and sprinklers,
- There is larger need to look into the water scarcity and measures to provide adequate irrigation facilities,
- Support to land development is one priority for any further support to intensify crop cultivation as many have steep land terrain,

- Soil testing could help identifying right crops and for all season cultivation,
- Training of farmers in any crop cultivation, management, post harvest techniques needs to be time and again delivered with new technologies,
- Small storage facilities for the HHs (Lentils, Paddy, Maize, Beans, Ginger, Potato, Cardamom) will be highly beneficial,
- Cardamom management, disease prevention and drying technologies are much needed,
- Strong link is required with Farm Shops to ensure that they buy all agricultural produce,
- Rain water harvesting technologies in areas where there is scarcity of water could help farmers in irrigating several crops, apart from vegetables alone,
- For mass cultivation of the fallow land, that is being left owing to shortage of labour, having proper arrangement and provision to hire labour across the border (India) during required seasons could enable cultivation of the fallow land, mainly wetland for Paddy cultivation.
- Some of the seeds quality is poor. Supply of quality seeds with good germination rates are anticipated,
- Support towards cultivation of off-season vegetable crops clubbed with training and capacity building programs for interested farmers and vegetable groups,
- Conduct agriculture fairs at Gewog level, to attract traders / middlemen.
- Support establishment of marketing sheds at strategic locations, and
- Support advertisement of organic produce cultivated by farmers from FSAPP area.

5. CONCLUSIONS

- Though majority of the households in the project area have good houses (with concrete walls), flush toilet and good numbers of household's assets, in general HHs own very less agricultural equipments and machineries. Despite households having accessibility to certain inputs such as for sprayers, fertilizers, power tillers, agro-processing mills, most households have poor accessibility to transplanters, threshers, dryers and graders amongst others.
- Rural households are mostly dependent on agriculture (about 88% HHs) for their cash income, followed by income from livestock but at the same about 60% of the HHs having annual cash income from all sources between Nu. 5,000 to Nu. 100,000 reflects that in overall cash income to the households are comparatively low in terms of their needs for necessary expenditure.
- About 70% of Chuzhing and about 78% of Kamzhing being cultivated by the rural households reflects significance of households' dependency on agriculture in the project area. However, it is also to be considered that all Chuzhing is not necessarily cultivated with Paddy but with other crops such as Cardamom, Ginger, potato and even vegetables.
- In general, majority of the households (67.2%) have reach to current market prices amongst the other market information but less than 50% have reach to information on trends in prices and knowledge about available markets, and it is mostly communicated through peer farmers and traders. However, HHs have poor access to marketing infrastructures in view of not having temporary or permanent market sheds, collection or packaging centres, and storage facilities.
- Though all HHs have food sufficiency (including those purchased), as staple food, 64.4% HHs not producing enough Paddy from own farm for 12 months household consumption reflects that food security situation from own farm is fragile.
- About 44% of the households having a medium dietary diversity, and 27.2% and 28.9% of the households having low and high food diversity respectively reflects

low household dietary diversity for farmers as compared to students having high dietary diversity with mean individual dietary diversity score of 8 for males and 7.8 for females.

- For majority of the households, participation in agricultural trainings / awareness and that for undertaking farm works are done equally by males and females but for decision making, as compared to females, its more HHs that depend on males as the head of the family.
- The households are challenged with several agricultural constrains and have expressed strong need to have appropriate technologies and measures to curb these challenges such as wild animals destroying crops; pests, diseases and weeds; inadequate irrigation facility and water; inadequate inputs; and unavailability of marketing infrastructures and markets.

6. ANNEXURE

Annex 1: Tables of Analysis from Survey Data

Table 1: Count of Respondents by Gender and Gewogs

Gewogs	Gender of the respondent		
	Male	**Female**	**Total**
Norbugang	65	23	88
Tendruk	79	60	139
Sangngagcholing	65	48	113
Dophuchen	89	44	133
Tading	116	33	149
Gakiling	32	26	58
Sangbaykha	28	39	67
Uesu	29	69	98
Samar	19	79	98
Bongo	59	62	121
Getana	22	41	63
Metakha	35	32	67
Dungna	86	52	138
Sampheling	92	28	120
Tareythang	20	32	52
Samtenling	47	50	97
Dekiling	93	50	143
Shompangkha	70	31	101
Gakidling	65	27	92
Kana	70	49	119
Drujeygang	56	84	140
Lhamoizingkha	80	37	117
Nichula	53	6	59
Karmaling	59	38	97
Total	1429	1040	2469

Source: FSAPP Baseline Household Survey, Oct – Nov, 2018, Bhutan Consulting Associates

Table 2: Count of Respondent's Household Heads by Gender and Gewogs

Gewogs	Gender of the Household Heads		
	Male	**Female**	**Total**
Norbugang	74	14	88
Tendruk	107	32	139
Sangngagcholing	82	31	113
Dophuchen	101	32	133
Tading	136	13	149
Gakiling	37	21	58
Sangbaykha	40	27	67
Uesu	31	67	98
Samar	20	78	98
Bongo	59	62	121
Getana	21	42	63
Metakha	32	35	67
Dungna	75	63	138
Sampheling	106	14	120
Tareythang	36	16	52
Samtenling	68	29	97
Dekiling	105	38	143
Shompangkha	86	15	101
Gakidling	74	18	92
Kana	76	43	119
Drujeygang	38	102	140
Lhamoizingkha	87	30	117
Nichula	48	11	59
Karmaling	83	14	97
Total	**1622**	**847**	**2469**

Source: FSAPP Baseline Household Survey, Oct – Nov, 2018, Bhutan Consulting Associates

Table 3: Count of Single Mother Headed Households by Gewogs

Gewogs	Single Mother headed HHs		
	Yes	No	Total
Norbugang	5	83	88
Tendruk	21	118	139
Sangngagcholing	12	101	113
Dophuchen	6	127	133
Tading	4	145	149
Gakiling	6	52	58
Sangbaykha	7	60	67
Uesu	13	85	98
Samar	15	83	98
Bongo	10	111	121
Getana	5	58	63
Metakha	5	62	67
Dungna	8	130	138
Sampheling	4	116	120
Tareythang	2	50	52
Samtenling	9	88	97
Dekiling	14	129	143
Shompangkha	3	98	101
Gakidling	5	87	92
Kana	28	91	119
Drujeygang	32	108	140
Lhamoizingkha	7	110	117
Nichula	6	53	59
Karmaling	8	89	97
Total	235	2234	2469

Source: FSAPP Baseline Household Survey, Oct – Nov, 2018, Bhutan Consulting Associates

Table 4: Count and Percentage of Respondents by types of household assets owned and by Dzongkhags

Types of Assets owned by the HHs	Count and %	Dzongkhag					Total	
		Samtse	Haa	Chhukha	Sarpang	Dagana	Count	% of total
TV/ DVD/ Radio	Count	461	255	319	387	368	1790	72.5
	% within Dzkg	74.1%	79.4%	62.7%	79.8%	69.2%		
Rice cooker / curry cooker	Count	558	308	483	465	492	2306	93.4
	% within Dzkg	89.7%	96.0%	94.9%	95.9%	92.5%		
LPG cylinder and stove	Count	308	283	299	409	383	1682	68.1
	% within Dzkg	49.5%	88.2%	58.7%	84.3%	72.0%		
Washing machine	Count	18	68	25	49	21	181	7.3
	% within Dzkg	2.9%	21.2%	4.9%	10.1%	3.9%		
Refrigerator	Count	254	153	171	341	228	1147	46.5
	% within Dzkg	40.8%	47.7%	33.6%	70.3%	42.9%		
Power tiller	Count	3	27	11	17	26	84	3.4
	% within Dzkg	0.5%	8.4%	2.2%	3.5%	4.9%		
Tractor	Count	2	1	1	2	6	12	0.5
	% within Dzkg	0.3%	0.3%	0.2%	0.4%	1.1%		
Sprinklers	Count	158	23	38	167	123	509	20.6
	% within Dzkg	25.4%	7.2%	7.5%	34.4%	23.1%		
Sprayers	Count	43	21	24	93	101	282	11.4
	% within Dzkg	6.9%	6.5%	4.7%	19.2%	19.0%		
Rice huller	Count	13	18	33	23	45	132	5.3
	% within Dzkg	2.1%	5.6%	6.5%	4.7%	8.5%		
Maize flour mill	Count	9	13	20	21	27	90	3.6
	% within Dzkg	1.4%	4.0%	3.9%	4.3%	5.1%		
Flake making machine	Count	6	1	4	1	1	13	0.5
	% within Dzkg	1.0%	0.3%	0.8%	0.2%	0.2%		
Chips making machine	Count	1	0	0	1	1	3	0.1
	% within Dzkg	0.2%	0.0%	0.0%	0.2%	0.2%		
Paddy transplanter	Count	1	0	0	2	0	3	0.1
	% within Dzkg	0.2%	0.0%	0.0%	0.4%	0.0%		

Paddy harvester	Count	0	1	1	6	3	11	0.4
	% within Dzkg	0.0%	0.3%	0.2%	1.2%	0.6%		
Paddy thresher	Count	1	0	7	5	8	21	0.9
	% within Dzkg	0.2%	0.0%	1.4%	1.0%	1.5%		
Vehicles	Count	81	101	69	105	86	442	17.9
	% within Dzkg	13.0%	31.5%	13.6%	21.6%	16.2%		
Cell phone	Count	607	305	484	452	504	2352	95.3
	% within Dzkg	97.6%	95.0%	95.1%	93.2%	94.7%		
Total	Count	622	321	509	485	532	2469	100

Source: FSAPP Baseline Household Survey, Oct – Nov, 2018, Bhutan Consulting Associates

Table 5: Count and Percentage of Respondents by types of houses owned and by Dzongkhags

Houses types owned by the HHs	**Count and %**	**Dzongkhag**					**Total**
		Samtse	**Haa**	**Chhukha**	**Sarpang**	**Dagana**	
Thatched / bamboo wall with banana or hay roof	Count	11	1	1	1	1	15
	% within Dzkg	1.8%	0.3%	0.2%	0.2%	0.2%	0.6%
Thatched / bamboo wall with shingle roof	Count	12	8	5	17	32	74
	% within Dzkg	1.9%	2.5%	1.0%	3.5%	6.0%	3.0%
Thatched / bamboo wall with CGI roof	Count	61	3	30	68	74	236
	% within Dzkg	9.8%	0.9%	5.9%	14.0%	13.9%	9.6%
Wooden wall with shingle	Count	10	9	8	12	8	47
	% within Dzkg	1.6%	2.8%	1.6%	2.5%	1.5%	1.9%
Wooden wall with CGI roof	Count	54	22	69	45	92	282
	% within Dzkg	8.7%	6.9%	13.6%	9.3%	17.3%	11.4%
Mud and stone wall with shingle roof	Count	17	11	22	11	53	114
	% within Dzkg	2.7%	3.4%	4.3%	2.3%	10.0%	4.6%
Mud and stone wall with CGI roof	Count	152	241	185	49	159	786
	% within Dzkg	24.4%	75.1%	36.3%	10.1%	29.9%	31.8%
Concrete wall with shingle roof	Count	15	20	8	56	11	110
	% within Dzkg	2.4%	6.2%	1.6%	11.5%	2.1%	4.5%
Concrete wall with CGI roof	Count	284	4	179	225	100	792
	% within Dzkg	45.7%	1.2%	35.2%	46.4%	18.8%	32.1%
Don't have own house	Count	6	2	2	1	2	13
	% within Dzkg	1.0%	0.6%	0.4%	0.2%	0.4%	0.5%
Total	Count	622	321	509	485	532	2469
	%	100%	100%	100%	100%	100%	100%

Source: FSAPP Baseline Household Survey, Oct – Nov, 2018, Bhutan Consulting Associates

Table 6: Count and Percentage of Respondents with various sources of income and by Dzongkhags

Income sources	**Count and %**	Dzongkhag					Total	
		Samtse	Haa	Chhukha	Sarpang	Dagana	Count	% of total
Agriculture	Count	557	278	463	407	462	2167	87.8
	% within Dzkg	89.5%	86.6%	91.0%	83.9%	86.8%		
Livestock	Count	134	183	210	267	205	999	40.5
	% within Dzkg	21.5%	57.0%	41.3%	55.1%	38.5%		
NWFPs	Count	9	40	38	5	22	114	4.6
	% within Dzkg	1.4%	12.5%	7.5%	1.0%	4.1%		
Off farm activities	Count	290	66	179	169	166	870	35.2
	% within Dzkg	46.6%	20.6%	35.2%	34.8%	31.2%		
Business	Count	69	25	36	51	46	227	9.2
	% within Dzkg	11.1%	7.8%	7.1%	10.5%	8.6%		
Potter / pony	Count	3	2	0	1	0	6	0.2
	% within Dzkg	0.5%	0.6%	0.0%	0.2%	0.0%		
Vehicle hire out	Count	12	16	13	4	9	54	2.2
	% within Dzkg	1.9%	5.0%	2.6%	0.8%	1.7%		
Remittances / salary / pension)	Count	137	111	152	134	143	677	27.4
	% within Dzkg	22.0%	34.6%	29.9%	27.6%	26.9%		

None	Count	9	9	3	6	8	35	1.4
	% within Dzkg	1.4%	2.8%	0.6%	1.2%	1.5%		
Total	Count	622	321	509	485	532	2469	100.0

Source: FSAPP Baseline Household Survey, Oct – Nov, 2018, Bhutan Consulting Associates

Table 7: Count and Percentage of Respondents indicating main income earners to the households and by Dzongkhags

Main Income Earners in HHs	**Count and %**	Dzongkhag					Total
		Samtse	Haa	Chhukha	Sarpang	Dagana	
Solely father	Count	236	71	143	134	150	734
	% within Dzkg	37.9%	22.1%	28.1%	27.6%	28.2%	29.7%
Solely mother	Count	49	54	58	25	64	250
	% within Dzkg	7.9%	16.8%	11.4%	5.2%	12.0%	10.1%
Father and mother	Count	123	76	95	121	126	541
	% within Dzkg	19.8%	23.7%	18.7%	24.9%	23.9%	22.0%
Solely sons	Count	53	18	26	39	39	175
	% within Dzkg	8.5%	5.6%	5.1%	8.0%	7.3%	7.1%
Parents and sons	Count	39	26	40	26	23	154
	% within Dzkg	6.3%	8.1%	7.9%	5.4%	4.3%	6.2%
Solely daughter	Count	11	10	10	9	11	51
	% within Dzkg	1.8%	3.1%	2.0%	1.9%	2.1%	2.1%
Parents and daughters	Count	7	8	16	3	3	37
	% within Dzkg	1.1%	2.5%	3.1%	0.6%	0.6%	1.5%
Parents, sons and daughters	Count	24	41	59	17	17	158
	% within Dzkg	3.9%	12.8%	11.6%	3.5%	3.2%	6.4%
All residing in the household	Count	71	8	59	105	91	334
	% within Dzkg	11.4%	2.5%	11.6%	21.6%	17.1%	13.5%
Don't have cash income	Count	9	9	3	6	8	35
	% within Dzkg	1.4%	2.8%	0.6%	1.2%	1.3%	1.4%
Total	Count	622	321	509	485	532	2469

Source: FSAPP Baseline Household Survey, Oct – Nov, 2018, Bhutan Consulting Associates

Table 8: Total area of Chuzhing and Kamzhing owned and cultivated (or left fallow) by the respondent's households.

Total Chuzhing owned (acres)	1996.3
Total Chuzhing cultivated (acres)	1402.5
Total Chuzhing left fallow (acres)	497.8
Total Chuzhing Leased out (acres)	96.0
Total Chuzhing Leased in (acres)	158.4
Percentage of Chuzhing cultivated	70.3
Percentage of Chuzhing left fallow	24.9
Percentage of Chuzhing Leased out	4.8
Total Kamzhing owned (acres)	7545.5
Total Kamzhing cultivated (acres)	6016.8
Total Kamzhing left fallow (acres)	1458.2
Total Kamzhing Leased out (acres)	70.5
Total Kamzhing Leased in (acres)	219.3
Percentage of Kamzhing cultivated	79.7
Percentage of Kamzhing left fallow	19.3
Percentage of Kamzhing Leased out	0.9

Source: FSAPP Baseline Household Survey, Oct – Nov, 2018, Bhutan Consulting Associates

Table 9: Count and Percentage of Respondents with accessibility to inputs by types and by Dzongkhags

Types of Inputs accessible to the HHs	**Count and %**	Dzongkhag					Total	
		Samtse	Haa	Chhukha	Sarpang	Dagana	Count	% of total
Improved seeds and seedlings	Count	509	314	474	459	506	2262	91.6
	% in Dzkg	81.8%	97.8%	93.1%	94.6%	95.1%		
Sprayers	Count	116	59	67	164	112	518	21.0
	% in Dzkg	18.6%	18.4%	13.2%	33.8%	21.1%		
Fertilizer	Count	121	151	69	196	62	599	24.3
	% in Dzkg	19.5%	47.0%	13.6%	40.4%	11.7%		
Insecticides / pesticides	Count	25	133	90	140	126	514	20.8
	% in Dzkg	4.0%	41.4%	17.7%	28.9%	23.7%		
Power tiller	Count	41	185	102	172	131	631	25.6
	% in Dzkg	6.6%	57.6%	20.0%	35.5%	24.6%		
Improved Packaging materials	Count	378	85	276	19	55	813	32.9
	% in Dzkg	60.8%	26.5%	54.2%	3.9%	10.3%		
Transplanter	Count	2	1	0	12	9	24	1.0
	% in Dzkg	0.3%	0.3%	0.0%	2.5%	1.7%		
Harvester	Count	1	4	0	19	40	64	2.6
	% in Dzkg	0.2%	1.2%	0.0%	3.9%	7.5%		
Thresher	Count	9	1	14	26	57	107	4.3
	% in Dzkg	1.4%	0.3%	2.8%	5.4%	10.7%		
Dryers	Count	1	8	7	2	1	19	0.8
	% in Dzkg	0.2%	2.5%	1.4%	0.4%	0.2%		
Grader	Count	0	0	1	8	5	14	0.6
	% in Dzkg	0.0%	0.0%	0.2%	1.6%	0.9%		
De-husker	Count	15	19	75	17	37	163	6.6
	% in Dzkg	2.4%	5.9%	14.7%	3.5%	7.0%		
Agro processing and value addition facilities	Count	140	45	152	2	3	342	13.9
	% in Dzkg	22.5%	14.0%	29.9%	0.4%	0.6%		
Easy access to credits	Count	61	225	245	68	80	679	27.5
	% in Dzkg	9.8%	70.1%	48.1%	14.0%	15.0%		
	Count	622	321	509	485	532	2469	100.0

Source: FSAPP Baseline Household Survey, Oct – Nov, 2018, Bhutan Consulting Associates

Table 10: Count and Percentage of Respondents with accessibility to irrigation facilities by types and by Gewogs

Types of Irrigation facilities accessible to the HHs	**Count and %**	Surface channel	Drip irrigation	Small pipes with sprinklers	Rain water dependent	Storage tanks	From drinking water taps	Have none	Total
Norbugang	Count	29	5	13	53	28	52	11	88
	% in Gewog	33.0%	5.7%	14.8%	60.2%	31.8%	59.1%	12.5%	
Tendruk	Count	42	2	46	71	44	97	4	139
	% in Gewog	30.2%	1.4%	33.1%	51.1%	31.7%	69.8%	2.9%	
Sangn/choling	Count	54	13	16	46	32	84	3	113
	% in Gewog	47.8%	11.5%	14.2%	40.7%	28.3%	74.3%	2.7%	
Dophuchen	Count	47	1	19	38	53	102	7	133
	% in Gewog	35.3%	0.8%	14.3%	28.6%	39.8%	76.7%	5.3%	
Tading	Count	13	0	14	29	52	126	2	149
	% in Gewog	8.7%	0.0%	9.4%	19.5%	34.9%	84.6%	1.3%	
Gakiling	Count	18	7	0	6	0	14	31	58
	% in Gewog	31.0%	12.1%	0.0%	10.3%	0.0%	24.1%	53.4%	
Sangbaykha	Count	31	9	5	14	0	31	13	67
	% in Gewog	46.3%	13.4%	7.5%	20.9%	0.0%	46.3%	19.4%	
Uesu	Count	15	8	3	11	1	60	31	98
	% in Gewog	15.3%	8.2%	3.1%	11.2%	1.0%	61.2%	31.6%	
Samar	Count	10	4	2	41	0	58	32	98
	% in Gewog	10.2%	4.1%	2.0%	41.8%	0.0%	59.2%	32.7%	

Bongo	Count	62	9	4	57	2	65	15	121
	% in Gewog	51.2%	7.4%	3.3%	47.1%	1.7%	53.7%	12.4%	
Getana	Count	53	6	0	37	0	37	0	63
	% in Gewog	84.1%	9.5%	0.0%	58.7%	0.0%	58.7%	0.0%	
Metakha	Count	56	6	7	46	1	28	6	67
	% in Gewog	83.6%	9.0%	10.4%	68.7%	1.5%	41.8%	9.0%	
Dungna	Count	126	1	0	83	1	72	4	138
	% in Gewog	91.3%	0.7%	0.0%	60.1%	0.7%	52.2%	2.9%	
Sampheling	Count	21	0	9	41	40	99	3	120
	% in Gewog	17.5%	0.0%	7.5%	34.2%	33.3%	82.5%	2.5%	
Tareythang	Count	13	0	4	15	6	25	14	52
	% in Gewog	25.0%	0.0%	7.7%	28.8%	11.5%	48.1%	26.9%	
Samtenling	Count	37	0	10	25	11	69	6	97
	% in Gewog	38.1%	0.0%	10.3%	25.8%	11.3%	71.1%	6.2%	
Dekiling	Count	27	1	15	64	9	93	30	143
	% in Gewog	18.9%	0.7%	10.5%	44.8%	6.3%	65.0%	21.0%	
Shompangkha	Count	9	2	16	45	1	68	37	101
	% in Gewog	8.9%	2.0%	15.8%	44.6%	1.0%	67.3%	36.6%	
Gakidling	Count	23	0	14	30	1	58	32	92
	% in Gewog	25.0%	0.0%	15.2%	32.6%	1.1%	63.0%	34.8%	
Kana	Count	78	2	8	32	30	51	1	119
	% in Gewog	65.5%	1.7%	6.7%	26.9%	25.2%	42.9%	0.8%	
Drujeygang	Count	65	1	3	46	11	89	1	140
	% in Gewog	46.4%	0.7%	2.1%	32.9%	7.9%	63.6%	0.7%	
Lhamoizingkha	Count	70	0	3	14	7	67	18	117
	% in Gewog	59.8%	0.0%	2.6%	12.0%	6.0%	57.3%	15.4%	
Nichula	Count	25	2	16	18	1	35	11	59
	% in Gewog	42.4%	3.4%	27.1%	30.5%	1.7%	59.3%	18.6%	
Karmaling	Count	39	1	28	39	4	49	9	97
	% in Gewog	40.2%	1.0%	28.9%	40.2%	4.1%	50.5%	9.3%	
Total	Count	963	80	255	901	335	1529	321	2469

Source: FSAPP Baseline Household Survey, Oct – Nov, 2018, Bhutan Consulting Associates

Table 11: Count and Percentage of Respondents with technologies adopted by types and by Dzongkhags

Types of technologies adopted by the HHs	**Count and %**	**Dzongkhag**					**Total**	
		Samtse	**Haa**	**Chhukha**	**Sarpang**	**Dagana**	**Count**	**% of total**
Crop rotation	Count	486	251	417	243	261	1658	67.2
	% within Dzkg	78.1%	78.2%	81.9%	50.1%	49.1%		
Intercropping	Count	481	219	352	140	178	1370	55.5
	% within Dzkg	77.3%	68.2%	69.2%	28.9%	33.5%		
Contour farming	Count	449	243	461	180	190	1523	61.7
	% within Dzkg	72.2%	75.7%	90.6%	37.1%	35.7%		
Manure / leaf litter application	Count	559	274	471	293	395	1992	80.7
	% within Dzkg	89.9%	85.4%	92.5%	60.4%	74.2%		
Using compost	Count	204	42	58	90	88	482	19.5
	% within Dzkg	32.8%	13.1%	11.4%	18.6%	16.5%		
Terracing	Count	61	57	92	24	24	258	10.4
	% within Dzkg	9.8%	17.8%	18.1%	4.9%	4.5%		
Cover crop	Count	12	58	60	59	24	213	8.6
	% within Dzkg	1.9%	18.1%	11.8%	12.2%	4.5%		
Mulch	Count	185	40	125	22	44	416	16.8
	% within Dzkg	29.7%	12.5%	24.6%	4.5%	8.3%		
Control drainage seepage	Count	49	0	6	80	73	208	8.4
	% within Dzkg	7.9%	0.0%	1.2%	16.5%	13.7%		
Drip irrigation	Count	9	30	20	4	4	67	2.7
	% within Dzkg	1.4%	9.3%	3.9%	0.8%	0.8%		
Use pipes and sprinklers	Count	148	14	26	85	77	350	14.2
	% within Dzkg	23.8%	4.4%	5.1%	17.5%	14.5%		
Improved seeds and seedlings	Count	323	285	442	268	223	1541	62.4
	% within Dzkg	51.9%	88.8%	86.8%	55.3%	41.9%		

Types of technologies adopted by the HHs	Count and %	Dzongkhag					Total	
		Samtse	Haa	Chhukha	Sarpang	Dagana	Count	% of total
Farm mechanization	Count	5	124	46	107	95	377	15.3
	% within Dzkg	0.8%	38.6%	9.0%	22.1%	17.9%		
Electric fencing	Count	15	103	11	122	128	379	15.4
	% within Dzkg	2.4%	32.1%	2.2%	25.2%	24.1%		
Poly houses / shade nets / fencing nets	Count	93	32	150	96	56	427	17.3
	% within Dzkg	15.0%	10.0%	29.5%	19.8%	10.5%		
Transplanter	Count	0	1	1	6	2	10	0.4
	% within Dzkg	0.0%	0.3%	0.2%	1.2%	0.4%		
Water harvesting	Count	12	3	15	3	3	36	1.5
	% within Dzkg	1.9%	0.9%	2.9%	0.6%	0.6%		
None	Count	9	8	7	12	6	42	1.7
	% within Dzkg	1.4%	2.5%	1.4%	2.5%	1.1%		
Total	Count	622	321	509	485	532	2469	100.0

Source: FSAPP Baseline Household Survey, Oct – Nov, 2018, Bhutan Consulting Associates

Table 12: Count and Percentage of Respondents with technologies adopted by types and by Gewogs

Gewogs	**Count and %**	Crop rotation	Intercropping	Contour farming	Manure / leaf litter application	Using compost	Terracing	Cover crop	Mulch	Control drainage seepage	Drip irrigation	Use pipes and sprinklers	Improved seeds and seedlings	Farm mechanization	Electric fencing	Poly houses	Transplanter	Water harvesting	None	Total
Norbugang	Count	70	63	58	74	34	9	11	47	9	2	17	49	3	2	6	0	2	2	88
	% in Gewog	79.5	71.6	65.9	84.1	38.6	10.2	12.5	53.4	10.2	2.3	19.3	55.7	3.4	2.3	6.8	0.0	2.3	2.3	
Tendruk	Count	126	121	94	114	47	11	0	35	13	0	59	71	0	0	15	0	0	2	139
	% in Gewog	90.6	87.1	67.6	82.0	33.8	7.9	0.0	25.2	9.4	0.0	42.4	51.1	0.0	0.0	10.8	0.0	0.0	1.4	
Sang/choling	Count	88	81	72	105	41	11	1	32	18	7	22	56	0	4	3	0	0	1	113
	% in Gewog	77.9	71.7	63.7	92.9	36.3	9.7	0.9	28.3	15.9	6.2	19.5	49.6	0.0	3.5	2.7	0.0	0.0	0.9	
Dophuchen	Count	108	102	102	124	41	16	0	40	7	0	21	68	0	1	35	0	0	2	133
	% in Gewog	81.2	76.7	76.7	93.2	30.8	12.0	0.0	30.1	5.3	0.0	15.8	51.1	0.0	0.8	26.3	0.0	0.0	1.5	
Tading	Count	94	114	123	142	41	14	0	31	2	0	29	79	2	8	34	0	10	2	149
	% in Gewog	63.1	76.5	82.6	95.3	27.5	9.4	0.0	20.8	1.3	0.0	19.5	53.0	1.3	5.4	22.8	0.0	6.7	1.3	
Gakiling	Count	44	33	31	39	5	12	10	7	0	7	0	48	11	1	2	1	0	2	58
	% in Gewog	75.9	56.9	53.4	67.2	8.6	20.7	17.2	12.1	0.0	12.1	0.0	82.8	19.0	1.7	3.4	1.7	0.0	3.4	
Sangbaykha	Count	60	43	46	57	9	11	12	13	0	10	5	55	13	4	7	0	2	1	67
	% in Gewog	89.6	64.2	68.7	85.1	13.4	16.4	17.9	19.4	0.0	14.9	7.5	82.1	19.4	6.0	10.4	0.0	3.0	1.5	
Uesu	Count	68	68	87	90	15	18	19	12	0	9	5	92	57	35	11	0	1	3	98
	% in Gewog	69.4	69.4	88.8	91.8	15.3	18.4	19.4	12.2	0.0	9.2	5.1	93.9	58.2	35.7	11.2	0.0	1.0	3.1	
Samar	Count	79	75	79	88	13	16	17	8	0	4	4	90	43	63	12	0	0	2	98
	% in Gewog	80.6	76.5	80.6	89.8	13.3	16.3	17.3	8.2	0.0	4.1	4.1	91.8	43.9	64.3	12.2	0.0	0.0	2.0	
Bongo	Count	100	76	100	108	16	23	12	26	1	8	5	113	31	3	35	0	1	1	121
	% in Gewog	82.6	62.8	82.6	89.3	13.2	19.0	9.9	21.5	0.8	6.6	4.1	93.4	25.6	2.5	28.9	0.0	0.8	0.8	
Getana	Count	60	51	61	58	0	25	13	7	0	7	0	59	0	3	21	0	0	2	63
	% in Gewog	95.2	81.0	96.8	92.1	0.0	39.7	20.6	11.1	0.0	11.1	0.0	93.7	0.0	4.8	33.3	0.0	0.0	3.2	
Metakha	Count	64	47	67	66	3	10	9	17	1	3	8	66	2	1	26	0	0	0	67
	% in Gewog	95.5	70.1	100	98.5	4.5	14.9	13.4	25.4	1.5	4.5	11.9	98.5	3.0	1.5	38.8	0.0	0.0	0.0	
Dungna	Count	124	94	129	135	7	25	24	29	0	2	3	137	13	1	46	1	14	0	138
	% in Gewog	89.9	68.1	93.5	97.8	5.1	18.1	17.4	21.0	0.0	1.4	2.2	99.3	9.4	0.7	33.3	0.7	10.1	0.0	
Sampheling	Count	69	84	104	104	32	9	2	46	4	0	10	67	0	3	22	0	0	4	120
	% in Gewog	57.5	70.0	86.7	86.7	26.7	7.5	1.7	38.3	3.3	0.0	8.3	55.8	0.0	2.5	18.3	0.0	0.0	3.3	
Tareythang	Count	16	22	20	35	0	2	17	0	3	0	8	20	29	35	25	1	1	2	52
	% in Gewog	30.8	42.3	38.5	67.3	0.0	3.8	32.7	0.0	5.8	0.0	15.4	38.5	55.8	67.3	48.1	1.9	1.9	3.8	
Samtenling	Count	39	25	29	57	9	11	18	4	13	0	13	41	24	23	23	2	1	1	97
	% in Gewog	40.2	25.8	29.9	58.8	9.3	11.3	18.6	4.1	13.4	0.0	13.4	42.3	24.7	23.7	23.7	2.1	1.0	1.0	
Dekiling	Count	72	31	49	84	24	4	15	5	23	1	28	71	32	15	9	2	0	8	143
	% in Gewog	50.3	21.7	34.3	58.7	16.8	2.8	10.5	3.5	16.1	0.7	19.6	49.7	22.4	10.5	6.3	1.4	0.0	5.6	

Gewogs	**Count and %**	Crop rotation	Intercropping	Contour farming	Manure / leaf litter application	Using compost	Terracing	Cover crop	Mulch	Control drainage seepage	Drip irrigation	Use pipes and sprinklers	Improved seeds and seedlings	Farm mechanization	Electric fencing	Poly houses	Transplanter	Water harvesting	None	Total
Shompangkha	Count	65	28	41	56	27	7	3	2	17	3	16	66	10	21	17	1	1	1	101
	% in Gewog	64.4	27.7	40.6	55.4	26.7	6.9	3.0	2.0	16.8	3.0	15.8	65.3	9.9	20.8	16.8	1.0	1.0	1.0	
Gakidling	Count	51	34	41	61	30	0	6	11	24	0	20	70	12	28	22	0	0	0	92
	% in Gewog	55.4	37.0	44.6	66.3	32.6	0.0	6.5	12.0	26.1	0.0	21.7	76.1	13.0	30.4	23.9	0.0	0.0	0.0	
Kana	Count	55	64	23	67	8	14	4	28	9	1	20	38	11	0	8	0	1	0	119
	% in Gewog	46.2	53.8	19.3	56.3	6.7	11.8	3.4	23.5	7.6	0.8	16.8	31.9	9.2	0.0	6.7	0.0	0.8	0.0	
Drujeygang	Count	80	82	43	95	6	6	9	10	0	0	3	17	3	6	8	0	2	1	140
	% in Gewog	57.1	58.6	30.7	67.9	4.3	4.3	6.4	7.1	0.0	0.0	2.1	12.1	2.1	4.3	5.7	0.0	1.4	0.7	
Lhamoizingkha	Count	40	6	32	96	32	3	2	3	31	2	0	69	39	64	16	2	0	5	117
	% in Gewog	34.2	5.1	27.4	82.1	27.4	2.6	1.7	2.6	26.5	1.7	0.0	59.0	33.3	54.7	13.7	1.7	0.0	4.3	
Nichula	Count	28	16	35	51	15	0	2	1	13	1	16	39	20	43	8	0	0	0	59
	% in Gewog	47.5	27.1	59.3	86.4	25.4	0.0	3.4	1.7	22.0	1.7	27.1	66.1	33.9	72.9	13.6	0.0	0.0	0.0	
Karmaling	Count	58	10	57	86	27	1	7	2	20	0	38	60	22	15	16	0	0	0	97
	% in Gewog	59.8	10.3	58.8	88.7	27.8	1.0	7.2	2.1	20.6	0.0	39.2	61.9	22.7	15.5	16.5	0.0	0.0	0.0	
Total	Count	1658	1370	1523	1992	482	258	213	416	208	67	350	1541	377	379	427	10	36	42	2469

Source: FSAPP Baseline Household Survey, Oct – Nov, 2018, Bhutan Consulting Associates

Table 13: Count and Percentage of Respondents with access to marketing infrastructures and by Dzongkhags

Marketing infrastructures	**Count and %**	Dzongkhag					Total		Estimates out of 8023 HHs
		Samtse	Haa	Chhukha	Sarpang	Dagana	Count	% of total	
Post harvest handling and packaging equipments	Count	371	172	301	252	274	1370	55.5	4452
	% within Dzkg	59.6%	53.6%	59.1%	52.0%	51.6%			
Collection / packaging centres	Count	4	14	69	8	4	99	4.0	322
	% within Dzkg	0.6%	4.4%	13.6%	1.6%	0.8%			
Small market sheds	Count	170	20	103	73	69	435	17.6	1414
	% within Dzkg	27.3%	6.2%	20.2%	15.1%	13.0%			
Farm shops	Count	41	178	215	26	26	486	19.7	1579
	% within Dzkg	6.6%	55.5%	42.2%	5.4%	4.9%			
Storage structures	Count	0	9	0	7	4	20	0.8	65
	% within Dzkg	0.0%	2.8%	0.0%	1.4%	0.8%			
None	Count	151	112	140	140	184	727	29.4	2362
	% within Dzkg	24.3%	34.9%	27.5%	28.9%	34.7%			
Total	Count	622	321	509	485	531	2468	100.0	

Source: FSAPP Baseline Household Survey, Oct – Nov, 2018, Bhutan Consulting Associates

Table 14: Count and Percentage of Respondents with access to marketing infrastructures and by Gewogs

Gewogs	Count and %	Types of Marketing Infrastructures						Total
		Improved post harvest equipments	Collection / packaging centres	Small market sheds	Farm shops	Storage structures	None	
Norbugang	Count	34	1	17	4	0	38	88
	% within Gewog	38.6%	1.1%	19.3%	4.5%	0.0%	43.2%	
Tendruk	Count	90	0	36	3	0	22	139
	% within Gewog	64.7%	0.0%	25.9%	2.2%	0.0%	15.8%	
Sangngagcholing	Count	60	3	13	20	0	33	113
	% within Gewog	53.1%	2.7%	11.5%	17.7%	0.0%	29.2%	
Dophuchen	Count	89	0	47	4	0	28	133
	% within Gewog	66.9%	0.0%	35.3%	3.0%	0.0%	21.1%	
Tading	Count	98	0	57	10	0	30	149
	% within Gewog	65.8%	0.0%	38.3%	6.7%	0.0%	20.1%	
Gakiling	Count	9	2	5	10	6	37	58
	% within Gewog	15.5%	3.4%	8.6%	17.2%	10.3%	63.8%	
Sangbaykha	Count	37	3	2	42	2	18	67
	% within Gewog	55.2%	4.5%	3.0%	62.7%	3.0%	26.9%	
Uesu	Count	83	6	5	85	1	9	98
	% within Gewog	84.7%	6.1%	5.1%	86.7%	1.0%	9.2%	
Samar	Count	43	3	8	41	0	48	98
	% within Gewog	43.9%	3.1%	8.2%	41.8%	0.0%	49.0%	
Bongo	Count	40	28	26	31	0	53	121
	% within Gewog	33.1%	23.1%	21.5%	25.6%	0.0%	43.8%	
Getana	Count	61	15	8	60	0	1	63
	% within Gewog	96.8%	23.8%	12.7%	95.2%	0.0%	1.6%	
Metakha	Count	4	16	6	4	0	47	67
	% within Gewog	6.0%	23.9%	9.0%	6.0%	0.0%	70.1%	
Dungna	Count	120	10	14	120	0	14	138
	% within Gewog	87.0%	7.2%	10.1%	87.0%	0.0%	10.1%	
Sampheling	Count	76	0	49	0	0	25	120
	% within Gewog	63.3%	0.0%	40.8%	0.0%	0.0%	20.8%	
Tareythang	Count	31	2	0	4	2	16	52
	% within Gewog	59.6%	3.8%	0.0%	7.7%	3.8%	30.8%	
Samtenling	Count	41	2	27	11	1	23	97
	% within Gewog	42.3%	2.1%	27.8%	11.3%	1.0%	23.7%	
Dekiling	Count	73	0	21	9	1	45	143
	% within Gewog	51.0%	0.0%	14.7%	6.3%	0.7%	31.5%	
Shompangkha	Count	65	4	4	0	3	26	101
	% within Gewog	64.4%	4.0%	4.0%	0.0%	3.0%	25.7%	
Gakidling	Count	42	0	21	2	0	30	92
	% within Gewog	45.7%	0.0%	22.8%	2.2%	0.0%	32.6%	
Kana	Count	38	0	31	2	3	61	118
	% within Gewog	32.2%	0.0%	26.3%	1.7%	2.5%	51.7%	
Drujeygang	Count	66	0	38	13	1	35	140
	% within Gewog	47.1%	0.0%	27.1%	9.3%	0.7%	25.0%	
Lhamoizingkha	Count	72	0	0	4	0	41	117
	% within Gewog	61.5%	0.0%	0.0%	3.4%	0.0%	35.0%	
Nichula	Count	33	2	0	0	0	24	59
	% within Gewog	55.9%	3.4%	0.0%	0.0%	0.0%	40.7%	
Karmaling	Count	65	2	0	7	0	23	97
	% within Gewog	67.0%	2.1%	0.0%	7.2%	0.0%	23.7%	
Total	Count	1370	99	435	486	20	727	2468

Source: FSAPP Baseline Household Survey, Oct – Nov, 2018, Bhutan Consulting Associates

Table 15: Count and Percentage of Respondents with most common markets for selling produce by types of markets and by Gewogs

Gewogs	Count and %	Most common markets								Total
		Farm shops	Schools / institutions	Farm gate	Permanent market sheds	Temporary market sheds	Middlemen	Auction yards	Do not market any produce	
Norbugang	Count	5	1	12	36	13	24	2	27	88
	% within Gewog	5.7%	1.1%	13.6%	40.9%	14.8%	27.3%	2.3%	30.7%	
Tendruk	Count	2	7	16	68	23	55	0	15	139
	% within Gewog	1.4%	5.0%	11.5%	48.9%	16.5%	39.6%	0.0%	10.8%	
Sangngagcholing	Count	0	2	23	35	13	41	0	48	113
	% within Gewog	0.0%	1.8%	20.4%	31.0%	11.5%	36.3%	0.0%	42.5%	
Dophuchen	Count	0	13	18	52	20	44	1	29	133
	% within Gewog	0.0%	9.8%	13.5%	39.1%	15.0%	33.1%	0.8%	21.8%	
Tading	Count	2	12	14	74	23	37	2	37	149
	% within Gewog	1.3%	8.1%	9.4%	49.7%	15.4%	24.8%	1.3%	24.8%	
Gakiling	Count	0	7	12	11	1	8	11	22	58
	% within Gewog	0.0%	12.1%	20.7%	19.0%	1.7%	13.8%	19.0%	37.9%	
Sangbaykha	Count	6	8	12	25	0	11	26	16	67
	% within Gewog	9.0%	11.9%	17.9%	37.3%	0.0%	16.4%	38.8%	23.9%	
Uesu	Count	0	13	12	50	0	11	61	12	98
	% within Gewog	0.0%	13.3%	12.2%	51.0%	0.0%	11.2%	62.2%	12.2%	
Samar	Count	0	2	24	43	0	23	76	9	98
	% within Gewog	0.0%	2.0%	24.5%	43.9%	0.0%	23.5%	77.6%	9.2%	
Bongo	Count	1	20	17	67	7	22	22	26	121
	% within Gewog	0.8%	16.5%	14.0%	55.4%	5.8%	18.2%	18.2%	21.5%	
Getana	Count	0	8	8	31	0	35	15	6	63
	% within Gewog	0.0%	12.7%	12.7%	49.2%	0.0%	55.6%	23.8%	9.5%	
Metakha	Count	0	15	7	30	0	28	18	7	67
	% within Gewog	0.0%	22.4%	10.4%	44.8%	0.0%	41.8%	26.9%	10.4%	
Dungna	Count	1	86	31	88	0	56	33	1	138
	% within Gewog	0.7%	62.3%	22.5%	63.8%	0.0%	40.6%	23.9%	0.7%	
Sampheling	Count	0	2	12	64	23	34	2	23	120
	% within Gewog	0.0%	1.7%	10.0%	53.3%	19.2%	28.3%	1.7%	19.2%	
Tareythang	Count	1	0	13	0	0	25	19	13	52
	% within Gewog	1.9%	0.0%	25.0%	0.0%	0.0%	48.1%	36.5%	25.0%	
Samtenling	Count	4	2	21	17	22	32	14	22	97
	% within Gewog	4.1%	2.1%	21.6%	17.5%	22.7%	33.0%	14.4%	22.7%	
Dekiling	Count	9	1	23	10	10	40	8	70	143
	% within Gewog	6.3%	0.7%	16.1%	7.0%	7.0%	28.0%	5.6%	49.0%	
Shompangkha	Count	2	3	16	14	7	52	5	22	101
	% within Gewog	2.0%	3.0%	15.8%	13.9%	6.9%	51.5%	5.0%	21.8%	
Gakidling	Count	0	1	23	24	14	37	4	17	92
	% within Gewog	0.0%	1.1%	25.0%	26.1%	15.2%	40.2%	4.3%	18.5%	
Kana	Count	2	7	37	9	7	62	5	23	119
	% within Gewog	1.7%	5.9%	31.1%	7.6%	5.9%	52.1%	4.2%	19.3%	
Drujeygang	Count	5	6	36	11	22	77	0	27	140
	% within Gewog	3.6%	4.3%	25.7%	7.9%	15.7%	55.0%	0.0%	19.3%	
Lhamoizingkha	Count	0	2	8	6	1	82	2	30	117
	% within Gewog	0.0%	1.7%	6.8%	5.1%	0.9%	70.1%	1.7%	25.6%	
Nichula	Count	0	0	8	8	3	39	0	10	59
	% within Gewog	0.0%	0.0%	13.6%	13.6%	5.1%	66.1%	0.0%	16.9%	
Karmaling	Count	0	2	11	15	0	57	6	21	97
	% within Gewog	0.0%	2.1%	11.3%	15.5%	0.0%	58.8%	6.2%	21.6%	
Total	Count	40	220	414	788	209	932	332	533	2469

Source: FSAPP Baseline Household Survey, Oct – Nov, 2018, Bhutan Consulting Associates

Table 16: Count of Respondents with accessibility to market information by types and by Gewogs

Gewogs	Count	Current market prices	Trends in market prices	Knowledge of available markets	Cost of accessing markets	Ease of market information	None	Total
Norbugang	Count	65	64	33	5	1	22	88
Tendruk	Count	129	114	20	0	0	9	139
Sangngagcholing	Count	65	38	8	1	1	45	113
Dophuchen	Count	90	37	4	5	0	39	133
Tading	Count	110	64	17	3	0	38	149
Gakiling	Count	27	18	24	3	0	21	58
Sangbaykha	Count	46	35	36	8	0	11	67
Uesu	Count	64	63	64	12	6	12	98
Samar	Count	60	52	52	23	7	18	98
Bongo	Count	74	62	67	28	1	19	121
Getana	Count	35	40	40	14	3	5	63
Metakha	Count	32	50	58	15	0	3	67
Dungna	Count	65	99	118	33	5	7	138
Sampheling	Count	81	50	11	0	0	36	120
Tareythang	Count	49	25	32	0	0	3	52
Samtenling	Count	80	38	44	3	0	8	97
Dekiling	Count	82	52	44	17	4	43	143
Shompangkha	Count	65	30	52	17	0	4	101
Gakidling	Count	68	42	48	12	0	4	92
Kana	Count	84	47	63	5	20	1	119
Drujeygang	Count	97	50	90	2	2	1	140
Lhamoizingkha	Count	79	32	43	7	0	16	117
Nichula	Count	45	24	33	3	0	7	59
Karmaling	Count	67	29	64	12	1	7	97
Total	Count	1659	1155	1065	228	51	379	2469

Source: FSAPP Baseline Household Survey, Oct – Nov, 2018, Bhutan Consulting Associates

Table 17: Count and percentage of Respondents with sources of market information by types and by Dzongkhags

Sources of market information	**Count and %**	Dzongkhag					Total	
		Samtse	Haa	Chhukha	Sarpang	Dagana	Count	% of total
Radio / TV	Count	22	174	100	138	139	573	23.2
	% within Dzkg	3.5%	54.2%	19.6%	28.5%	26.1%		
Newspapers	Count	4	6	2	14	1	27	1.1
	% within Dzkg	0.6%	1.9%	0.4%	2.9%	0.2%		
Social media	Count	12	145	186	26	23	392	15.9
	% within Dzkg	1.9%	45.2%	36.5%	5.4%	4.3%		
DAMC website	Count	3	2	0	2	3	10	0.4
	% within Dzkg	0.5%	0.6%	0.0%	0.4%	0.6%		
Interactive voice response	Count	0	23	7	17	26	73	3.0
	% within Dzkg	0.0%	7.2%	1.4%	3.5%	4.9%		
Extension officials	Count	6	6	23	53	29	117	4.7
	% within Dzkg	1.0%	1.9%	4.5%	10.9%	5.5%		
Traders / middlemen	Count	301	38	220	209	236	1004	40.7
	% within Dzkg	48.4%	11.8%	43.2%	43.1%	44.4%		
Dzongkhag marketing focal persons	Count	10	4	2	23	19	58	2.3
	% within Dzkg	1.6%	1.2%	0.4%	4.7%	3.6%		

Peer farmers	Count	437	176	318	203	266	1400	56.7
	% within Dzkg	70.3%	54.8%	62.5%	41.9%	50.0%		
None	Count	152	60	67	49	27	355	14.4
	% within Dzkg	24.4%	18.7%	13.2%	10.1%	5.1%		
Total	Count	622	321	509	485	532	2469	100.0

Source: FSAPP Baseline Household Survey, Oct – Nov, 2018, Bhutan Consulting Associates

Table 18: Count of Respondents with sources of market information by types and by Gewogs

Gewog	Count	Radio / TV	Newspapers	Social media	DAMC website	Interactive voice response	Extension officials	Traders / middlemen	Dzongkhag marketing focal persons	Peer farmers	None	Total
Norbugang	Count	9	3	8	3	0	4	42	5	61	22	88
Tendruk	Count	3	1	2	0	0	1	86	3	123	9	139
Sangngagcholing	Count	3	0	2	0	0	0	50	1	65	45	113
Dophuchen	Count	3	0	0	0	0	0	46	0	86	39	133
Tading	Count	4	0	0	0	0	1	77	1	102	37	149
Gakiling	Count	10	0	8	0	2	1	9	3	29	21	58
Sangbaykha	Count	24	0	38	0	1	0	13	1	35	10	67
Uesu	Count	67	3	45	1	10	2	9	0	60	12	98
Samar	Count	73	3	54	1	10	3	7	0	52	17	98
Bongo	Count	48	1	53	0	1	2	21	0	68	19	121
Getana	Count	16	0	30	0	1	1	26	1	40	5	63
Metakha	Count	12	0	33	0	1	2	28	0	44	3	67
Dungna	Count	20	1	69	0	3	17	87	0	90	7	138
Sampheling	Count	4	0	1	0	1	1	58	1	76	33	120
Tareythang	Count	13	1	4	0	3	15	24	0	33	3	52
Samtenling	Count	39	4	8	2	4	6	56	0	41	3	97
Dekiling	Count	49	6	8	0	5	9	53	11	44	37	143
Shompangkha	Count	24	3	3	0	2	14	36	5	43	2	101
Gakidling	Count	13	0	3	0	3	9	40	7	42	4	92
Kana	Count	64	1	14	0	19	8	44	8	62	1	119
Drujeygang	Count	63	0	2	0	1	4	35	6	88	1	140
Lhamoizingkha	Count	8	0	4	1	4	4	61	2	37	11	117
Nichula	Count	1	0	2	2	0	4	34	3	25	8	59
Karmaling	Count	3	0	1	0	2	9	62	0	54	6	97
Total	Count	573	27	392	10	73	117	1004	58	1400	355	2469

Source: FSAPP Baseline Household Survey, Oct – Nov, 2018, Bhutan Consulting Associates

Table 19: Count of Respondents indicating reasons for increased workload for females in agriculture and by Dzongkhags

Reasons for increased feminisation in agriculture	**Count and %**			Dzongkhag			Total	
		Samtse	Haa	Chhukha	Sarpang	Dagana	Count	%
Men rural-urban migration	Count	25	28	7	17	25	102	18.5
	% in Dzkg	25.3%	30.1%	6.7%	14.7%	18.1%		
Men engaged in off farm activities	Count	66	40	93	83	99	381	69.3
	% in Dzkg	66.7%	43.0%	89.4%	71.6%	71.7%		
Socially, women to take care of children and parents	Count	25	53	88	53	58	277	50.4
	% in Dzkg	25.3%	57.0%	84.6%	45.7%	42.0%		
Men migrate out owing to food insufficiency to make income	Count	10	3	4	13	16	46	8.4
	% in Dzkg	10.1%	3.2%	3.8%	11.2%	11.6%		
Higher wages for men than women	Count	32	17	1	17	9	76	13.8
	% in Dzkg	32.3%	18.3%	1.0%	14.7%	6.5%		
Total	Count	99	93	104	116	138	550	100.0

Source: FSAPP Baseline Household Survey, Oct – Nov, 2018, Bhutan Consulting Associates

Table 20: Count of respondents indicating main constraints facing agriculture by Dzongkhags

Agricultural Constraints		Dzongkhag					Total	%
		Samtse	Haa	Chhukha	Sarpang	Dagana		
Inadequate labour	Count	286	219	319	101	137	1062	43.0
Marginal land holdings	Count	43	15	21	113	98	290	11.7
Poor soil fertility	Count	191	55	100	128	67	541	21.9
Pests, diseases and weeds	Count	426	265	433	311	304	1739	70.4
Lack irrigation facilities	Count	234	188	308	389	236	1355	54.9
High production costs	Count	44	38	71	21	20	194	7.9
Inadequate availability of inputs	Count	114	214	307	149	228	1012	41.0
Insufficient seeds and seedlings	Count	64	13	85	22	40	224	9.1
Unavailability of markets	Count	31	220	341	114	215	921	37.3
Cheaper produce from India	Count	121	47	36	74	41	319	12.9
Expected prices not fetched	Count	138	157	342	137	142	916	37.1
Crops damage by wild animals	Count	466	218	434	386	393	1897	76.8
Farm mechanization impossible	Count	155	56	88	71	69	439	17.8
Lack skill on post harvest and processing	Count	14	112	165	139	117	547	22.2
Inadequate incentive for agriculture	Count	13	32	37	135	183	400	16.2
Inaccessibility (roads)	Count	46	33	73	34	44	230	9.3
Don't know	Count	46	17	5	2	10	80	3.2
Total	Count	622	321	509	485	532	2469	

Source: FSAPP Baseline Household Survey, Oct – Nov, 2018, Bhutan Consulting Associates

Annex 2: Inventory of Farmers Groups and Cooperatives till December 2017

Table 1: Farmers Groups and Cooperative details (Name, Location, Gewog, Dzongkhag, Functionalities, and Year of establishment)

Sl. No	Name of the Farmers Group or Primary Cooperatives	Location (Village)	Gewog	Dzongkhag	Year of establishment
1	Chungnkha Vegetable Production Group	Chungkha	Bongo	Chhukha	2015
2	Bongo WUA	Bongo	Bongo	Chhukha	2017
3	Dungna Tshesay Tshogpa	Dungna	Dungna	Chhukha	2013
4	Bachu Vegetable grower group	Bachu	Getana	Chhukha	2017
5	Bachu irrigation scheme	Bachu	Getana	Chhukha	Not known
6	Cheyul irrigation scheme	Cheyul	Getana	Chhukha	Not known
7	Phutsha irrigation scheme	Phutsha	Getana	Chhukha	Not known
8	Trashigang irrigation scheme	Trashigang	Getana	Chhukha	Not known
9	Daga irrigation scheme	Daga	Getana	Chhukha	Not known
10	Kuenphen Water User Group	Pangu	Metakha	Chhukha	2015
11	Pekatshey Road User Group	Pekatshey	Sampheling	Chhukha	2014
12	Burkhey Road User Group	Burkhey	Sampheling	Chhukha	2017
13	Pekatshey WUA	Pekatshey	Sampheling	Chhukha	2011
14	Yongsibi Sonam Detshen	Yongsibi	Drujeygang	Dagana	2016
15	Thuenpaphenzhe Vegetable Group	Menchhuna	Drujeygang	Dagana	2016
16	Tshamkanang Vegetable Group	Pangserpo	Drujeygang	Dagana	2016
17	Ugyencholing Vegetable Group	Thangna	Drujeygang	Dagana	2016
18	Ayebumtang Vegetable Group	Pangserpo	Drujeygang	Dagana	2017
19	Drukjeygang Aumtshu Detshen	Thangna	Drujeygang	Dagana	2015
20	Patala to Pangna irrigation channel	Patala	Drujeygang	Dagana	2015
21	Thangna to Pnagna irrigation channel	Thangna	Drujeygang	Dagana	2017
22	Dalithang Water user group	Dalithang/Pungzhi,Lhaling,Namzhigang	Kana	Dagana	2004
23	Kana Basu Yuwa	Tangrichu lun	Kana	Dagana	2005
24	Nindukha	Damalum	Kana	Dagana	2004
25	Chunabi Yuwa	Nadolum	Kana	Dagana	2012
26	Road User group	Dalithang,Pungzhi,Lhaling,Namzhigang,Bjurugang	Kana	Dagana	2017
27	Karmaling Irrigation Channel	Karmaling	Karmaling	Dagana	2011
28	Dorjiphu Irrigation Channel	Dorjiphu	Karmaling	Dagana	2009
29	Jamathang Irrigation Channel	Jamathang	Karmaling	Dagana	2009
30	sampang irrigation	farmgoan and Daragoan	Lhamoizingkha	Dagana	1973-1974
31	farmgoan irrigation channel	farmgoan	Lhamoizingkha	Dagana	1975

Sl. No	Name of the Farmers Group or Primary Cooperatives	Location (Village)	Gewog	Dzongkhag	Year of establishment
32	Majigoan irrigation channel	Majigoan	Lhamoizingkha	Dagana	1967
33	Sibsoney irrigation channel	Sibsoney	Lhamoizingkha	Dagana	1963
34	Chagay irrigation channel	Devitar	Lhamoizingkha	Dagana	1950
35	Nawtaley irrigation channel	Nawtaley	Lhamoizingkha	Dagana	1980-1981
36	Baleytar irrigation channel	Baleytar	Lhamoizingkha	Dagana	1965
37	Bichgaon Irrigation Channel	Dangribhu	Nichula	Dagana	2014
38	Gangatey Irrigation Channel	Damchuna	Nichula	Dagana	2017
39	Dramzekesa Irrigation Channel	Dramzekesa	Nichula	Dagana	2016
40	Yangtsena Irrigation user group	Yangtsena	Gakiling	Haa	2017
41	Nobgang Sanam Dechen	Nobgang	Samar	Haa	2015
42	Nobgang Vegetable production	Nobgang	Samar	Haa	2017
43	Langpa-Nobgang Road user group	Nobgang	Samar	Haa	2017
44	Dangreyboo Nagang Sonam Magyel Sanam Ngaelay tshogpa	Damphuchen	Dophuchen	Samtse	2014
45	Melong gang Thulogang Saving group	Melong gang	Dophuchen	Samtse	2017
46	Upper Somlachin	Somlachin	Dophuchen	Samtse	2007-2008
47	Dogap	Dogap	Dophuchen	Samtse	2004-2005
48	Birkulo	Somlachin	Dophuchen	Samtse	2012-2013
49	Lapchagoan	Lapchagoan	Dophuchen	Samtse	2013-2014
50	Lumbay	Lumbay	Dophuchen	Samtse	2013-2014
51	Damphuchen	Maney	Dophuchen	Samtse	2011-2012
52	Dapper Vegetable Production Group	Dapper	Norbugang	Samtse	2016
53	Kirney Vegetable Production Group	Kirney	Norbugang	Samtse	2015
54	Dipujora Vegetable production Group	Dipujora	Norbugang	Samtse	2016
55	Tharay Khola Irrigation channel (yangpelthang)	Yangphelthang	Norbugang	Samtse	2014
56	Dampheling Nga Vegetable Group	Damphelling Nga	Sangngagcholing	Samtse	2012
57	Dephelling Kha vegetable group	Dephelling Kha	Sangngagcholing	Samtse	2017
58	Khangzangling farm road user group	Khangzangling	Sangngagcholing	Samtse	2016
59	Nidupling farm road user group	Nidupling	Sangngagcholing	Samtse	2016
60	Nidupling Saga Gongphel Tshogpa	Nidupling	Sangngagcholing	Samtse	2011
61	Namsheling farm road user group	Namsheling	Sangngagcholing	Samtse	2017
62	Chungthung A farm road user group	Chuthung A	Sangngagcholing	Samtse	2017
63	Chuthung B farm road user group	Chuthung B	Sangngagcholing	Samtse	2017
64	Pamzing vegetable production group	Pamzing Woogma	Tading	Samtse	2015
65	Beachgoan vegetable production group	Damjagsha	Tading	Samtse	2015
66	Hirangtar vegetable production group	Hirangtar	Tading	Samtse	2015
67	Khempadara vegetable production group	Daragoan	Tading	Samtse	2015
68	Nawleygoan vegetable production group	Damjangsha	Tading	Samtse	2015

Sl. No	Name of the Farmers Group or Primary Cooperatives	Location (Village)	Gewog	Dzongkhag	Year of establishment
69	Malabasey vegetable production group	Malabasey	Tading	Samtse	2015
70	Dhupidhara vegetable production group	Pamzing Goongma	Tading	Samtse	2015
71	Simzee vegetable production group	Simzee	Tading	Samtse	2015
72	Titiring hatibar electric fencing user group	Tenpaling	Tading	Samtse	2015
73	Damjangsha electric fencing user group	Damjangsha	Tading	Samtse	2016
74	Panbari electric fencing user group	Simzee	Tading	Samtse	2017
75	Huluna electric fencing user group	Huluna	Tading	Samtse	2017
76	Norjangsha pipeline irrigation user group	Norjangsha	Tading	Samtse	2015
77	Damjangsha rain water harvesting group	Damjangsha	Tading	Samtse	2015
78	Tenpaling water harvesting group	Tenpaling	Tading	Samtse	2015
79	Barbhotey road user group	Barbhotey	Tading	Samtse	2017
80	Kungaling Cardamom Group	Dawathang	Tendruk	Samtse	2016
81	Kuchin Cardamom Group	Kachinkuchin	Tendruk	Samtse	2015
82	Kachin Cardamom Group	Kachinkuchin	Tendruk	Samtse	2015
83	Yargay Organic Farming Group	Miglamthang	Tendruk	Samtse	2015
84	Eto Meto Detshen	Miglamthang	Tendruk	Samtse	2015
85	Chungthangna Alangi Detshen	Miglamthang	Tendruk	Samtse	2015
86	Bindup Sonam Detshen	Miglamthang	Tendruk	Samtse	2015
87	Tendruk Vegetable group	Tendrukthang	Tendruk	Samtse	2015
88	Jumsa water user group	Jumsa	Tendruk	Samtse	2016
89	Gakidling vegetable group	Gakidling	Gakidling	Sarpang	2017
90	Gakidling water user group	Gakidling	Gakidling	Sarpang	2017
91	Gatemkha vegetable group	Gatemkha	Gakidling	Sarpang	2017
92	Sangkha vegetable group	Sangkha	Gakidling	Sarpang	2017
93	Rilangthang vegetable group	Rilangthang	Gakidling	Sarpang	2017
94	Gakidling WUA	Gakidling	Gakidling	Sarpang	2017
95	Shompangkha vegetable marketing group	All Chiwogs	Shompangkha	Sarpang	2017
96	Pemacholing Rangzhin Sonam Tshongdrel Detshen	Pemacholing	Tareythang	Sarpang	2016
97	Yeozergang Rangzin Sonam Sonam Tshongdrel Detshen	Yeozergang	Tareythang	Sarpang	2017
98	Tashicholing Rangzin Sonam Tshongdrel Detshen	Tashicholing	Tareythang	Sarpang	2017

Source: Source: FSAPP Gewog Agriculture Extension Officers

Table 2: Farmers Groups and Cooperative details (Functionalities, Types, Registration status, Operational status, membership by gender)

Sl. No	Name of the Farmers Group or Primary Cooperatives	Functionalities	Types	Registration status	Operational Status	Total Members	Male (Nos)	Female (Nos.)
1	Chungnkha Vegetable Production Group	Vegetable production and marketing	Farmers group	Non-formal	Functional	16	16	0
2	Bongo WUA	Irrigation water use management	Farmers group	Non-formal	Functional	45	35	10
3	Dungna Tshesay Tshogpa	Vegetable Production & Marketing	Farmers Group	Registered	Non-functional	13	13	0
4	Bachu Vegetable grower group	Vegetable production and marketing	Farmers Group	Non-formal	Functional	0	0	0
5	Bachu irrigation scheme	Irrigation water use management	Farmers group	Non-formal	Functional	20	20	0
6	Cheyul irrigation scheme	Irrigation water use management	Farmers group	Non-formal	Functional	32	22	10
7	Phutsha irrigation scheme	Irrigation water use management	Farmers group	Non-formal	Functional	26	18	8
8	Trashigang irrigation scheme	Irrigation water use management	Farmers group	Non-formal	Functional	12	6	6
9	Daga irrigation scheme	Irrigation water use management	Farmers group	Non-formal	Functional	14	7	7
10	Kuenphen Water User Group	Irrigation water use management	Farmers group	Non-formal	Functional	62	26	36
11	Pekatshey Road User Group	Maintain farm road properly	Farmers group	Non-formal	Functional	21	13	8
12	Burkhey Road User Group	Maintain farm road properly	Farmers group	Non-formal	Functional	32	22	10
13	Pekatshey WUA	Irrigation water use management	Farmers group	Non-formal	Functional	11	7	4
14	Yongsibi Sonam Detshen	Vegetable production	Farmers Group	Non-formal	Functional	8	0	8
15	Thuenpaphenzhe Vegetable Group	Vegetable production	Farmers Group	Registered	Functional	13	7	6
16	Tshamkanang Vegetable Group	Vegetable production	Farmers Group	Non-formal	Functional	10	2	8
17	Ugyencholing Vegetable Group	Vegetable production	Farmers Group	Non-formal	Functional	12	6	6
18	Ayebumtang Vegetable Group	Vegetable production	Farmers Group	Non-formal	Functional	4	0	4
19	Drukjeygang Aumtshu Detshen	Vegetable production	Farmers Group	Registered	Functional	4	0	4
20	Patala to Pangna irrigation channel	Irrigation water use management	Farmers group	Non-formal	Functional	50	28	22
21	Thangna to Pnagna irrigation channel	Irrigation water use management	Farmers group	Non-formal	Non-functional	90	35	55
22	Dalithang Water user group	Irrigation water use management	Farmers group	Non-formal	Functional	200	150	50
23	Kana Basu Yuwa	Irrigation water use management	Farmers group	Non-formal	Functional	11	7	4
24	Nindukha	Irrigation water use management	Farmers group	Non-formal	Functional	27	22	5
25	Chunabi Yuwa	Irrigation water use management	Farmers group	Non-formal	Functional	12	10	2
26	Road User group	Road maintenance	Farmers group	Non-formal	Functional	397	297	100
27	Karmaling Irrigation Channel	Irrigation water use management	Farmers group	Non-formal	Functional	88	40	48
28	Dorjiphu Irrigation Channel	Irrigation water use management	Farmers group	Non-formal	Functional	48	34	14
29	Jamathang Irrigation Channel	Irrigation water use management	Farmers group	Non-formal	Non-functional	34	20	14
30	sampang irrigation	Irrigation water use management	Farmers group	Non-formal	Functional	45	45	0
31	farmgoan irrigation channel	Irrigation water use management	Farmers group	Non-formal	Functional	20	20	0
32	Majigoan irrigation channel	Irrigation water use management	Farmers group	Non-formal	Functional	40	40	0
33	Sibsoney irrigation channel	Irrigation water use management	Farmers group	Non-formal	Functional	30	30	0
34	Chagay irrigation channel	Irrigation water use management	Farmers group	Non-formal	Functional	20	20	0
35	Nawtaley irrigation channel	Irrigation water use management	Farmers group	Non-formal	Functional	9	9	0
36	Baleytar irrigation channel	Irrigation water use management	Farmers group	Non-formal	Functional	15	15	0
37	Bichgaon Irrigation Channel	Irrigation water use management	Farmers group	Non-formal	Functional	16	16	0
38	Gangatey Irrigation Channel	Irrigation water use management	Farmers group	Non-formal	Functional	18	12	6
39	Dramzekesa Irrigation Channel	Irrigation water use management	Farmers group	Non-formal	Functional	13	11	2

Sl. No	Name of the Farmers Group or Primary Cooperatives	Functionalities	Types	Registration status	Operational Status	Total Members	Male (Nos)	Female (Nos.)
40	Yangtsena Irrigation user group	Irrigation water use management	Farmers group	Non-formal	Functional	11	4	7
41	Nobgang Sanam Dechen	Organic Buckwheat production	Farmers Group	Registered	Non-functional	27	10	17
42	Nobgang Vegetable production	Vegetables and cereal production	Farmers Group	Non-formal	Functional	13	4	9
43	Langpa-Nobgang Road user group	Routine maintenance of road	Farmers Group	Non-formal	Functional	57	39	18
44	Dangreyboo Nagang Sonam Magyel Sanam Ngaelay tshogpa	Group Saving	Cooperatives	Registered	Functional	88	48	40
45	Melong gang Thulogang Saving group	Group Saving	Farmers Group	Non-formal	Functional	58	45	13
46	Upper Somlachin	Irrigation water use management	Farmers group	Non-formal	Functional	35	20	15
47	Dogap	Irrigation water use management	Farmers group	Non-formal	Non-functional	78	40	38
48	Birkulo	Irrigation water use management	Farmers group	Non-formal	Functional	26	15	11
49	Lapchagoan	Irrigation water use management	Farmers group	Non-formal	Functional	24	20	4
50	Lumbay	Irrigation water use management	Farmers group	Non-formal	Functional	26	20	6
51	Damphuchen	Irrigation water use management	Farmers group	Non-formal	Functional	47	30	17
52	Dapper Vegetable Production Group	Vegetable production	Farmers group	Non-formal	Functional	9	4	5
53	Kirney Vegetable Production Group	Vegetable production	Farmers group	Non-formal	Functional	10	4	6
54	Dipujora Vegetable production Group	Vegetable production	Farmers group	Non-formal	Functional	9	5	4
55	Tharay Khola Irrigation channel (yangpelthang)	Irrigation water use management	Farmers group	Non-formal	Functional	6	3	3
56	Dampheling Nga Vegetable Group	Vegetable Production	Farmers Group	Non-formal	Functional	11	7	4
57	Dephelling Kha vegetable group	Vegetable Production	Farmers Group	Non-formal	Functional	6	3	3
58	Khangzangling farm road user group	Farm Road User and Maintenance	Farmers Group	Non-formal	Functional	70	36	34
59	Nidupling farm road user group	Farm Road User and Maintenance	Farmers Group	Non-formal	Functional	79	57	22
60	Nidupling Saga Gongphel Tshogpa	Ginger Production	Farmers Group	Non-formal	Non-functional	25	20	5
61	Namsheling farm road user group	Farm Road User and Maintenance	Farmers Group	Non-formal	Functional	37	21	16
62	Chungthung A farm road user group	Farm Road User and Maintenance	Farmers Group	Non-formal	Functional	24	20	4
63	Chuthung B farm road user group	Farm Road User and Maintenance	Farmers Group	Non-formal	Functional	14	9	5
64	Pamzing vegetable production group	Vegetable Production & Marketing	Farmers Group	Non-formal	Functional	5	3	2
65	Beachgoan vegetable production group	Vegetable Production & Marketing	Farmers Group	Non-formal	Functional	15	12	3
66	Hirangtar vegetable production group	Vegetable Production & Marketing	Farmers Group	Non-formal	Functional	8	8	0
67	Khempadara vegetable production group	Vegetable Production & Marketing	Farmers Group	Non-formal	Functional	12	12	0
68	Nawleygoan vegetable production group	Vegetable Production & Marketing	Farmers Group	Non-formal	Functional	5	5	0
69	Malabasey vegetable production group	Vegetable Production & Marketing	Farmers Group	Non-formal	Functional	13	12	1
70	Dhupidhara vegetable production group	Vegetable Production & Marketing	Farmers Group	Non-formal	Functional	7	3	4
71	Simzee vegetable production group	Vegetable Production & Marketing	Farmers Group	Non-formal	Functional	10	10	0
72	Titiring hatibar electric fencing user group	Electric fencing maintenance	Farmers Group	Non-formal	Functional	35	28	7
73	Damjangsha electric fencing user	Electric fencing maintenance	Farmers Group	Non-formal	Functional	30	26	4

Sl. No	Name of the Farmers Group or Primary Cooperatives	Functionalities	Types	Registration status	Operational Status	Total Members	Male (Nos)	Female (Nos.)
	group							
74	Panbari electric fencing user group	Electric fencing maintenance	Farmers Group	Non-formal	Functional	25	24	1
75	Huluna electric fencing user group	Electric fencing maintenance	Farmers Group	Non-formal	Functional	30	16	14
76	Norjangsha pipeline irrigation user group	Irrigation water use management	Farmers group	Non-formal	Non-functional	44	34	10
77	Damjangsha rain water harvesting group	Irrigation water use management	Farmers group	Non-formal	functional	21	15	6
78	Tenpaling water harvesting group	Irrigation water use management	Farmers group	Non-formal	functional	32	27	5
79	Barbhotey road user group	Road maintenance	Farmers group	Non-formal	functional	27	15	12
80	Kungaling Cardamom Group	Cardamom production	Farmers Group	Registered	Non-functional	4	2	2
81	Kuchin Cardamom Group	Cardamom production	Farmers Group	Registered	Non-functional	5	5	0
82	Kachin Cardamom Group	Cardamom production	Farmers Group	Registered	Non-functional	5	5	0
83	Yargay Organic Farming Group	Cardamom production	Farmers Group	Registered	Non-functional	5	4	1
84	Eto Meto Detshen	Cardamom production	Farmers Group	Registered	Non-functional	5	5	0
85	Chungthangna Alangi Detshen	Cardamom production	Farmers Group	Registered	Non-functional	6	4	2
86	Bindup Sonam Detshen	Cardamom production	Farmers Group	Registered	Non-functional	5	4	1
87	Tendruk Vegetable group	Vegetable production	Farmers Group	Non-formal	Functional	4	3	1
88	Jumsa water user group	Irrigation water use management	Farmers group	Non-formal	Non-functional	7	5	2
89	Gakidling vegetable group	Vegetable production	Farmers group	Non-formal	Functional	43	36	7
90	Gakidling water user group	Vegetable production	Farmers group	Non-formal	Functional	67	53	14
91	Gatemkha vegetable group	Vegetable production	Farmers group	Non-formal	Functional	24	9	15
92	Sangkha vegetable group	Vegetable production	Farmers group	Non-formal	Functional	54	25	29
93	Rilangthang vegetable group	Vegetable production	Farmers group	Non-formal	Functional	33	26	7
94	Gakidling WUA	Irrigation water use management	Farmers group	Non-formal	Functional	67	53	14
95	Shompangkha vegetable marketing group	Vegetable Production	Farmers group	Non-formal	Functional	31	25	6
96	Pemacholing Rangzhin Sonam Tshongdrel Detshen	Vegetable production	Farmers Group	Non-Formal	Functional	19	14	5
97	Yeozergang Rangzin Sonam Sonam Tshongdrel Detshen	Vegetable production	Farmers Group	Non-Formal	Functional	10	6	4
98	Tashicholing Rangzin Sonam Tshongdrel Detshen	Vegetable production	Farmers Group	Non-Formal	Functional	12	2	10

Source: FSAPP Gewog Agriculture Extension Officers

Table 3: Farmers Groups and Cooperative details (Gender of the office bearers, Capacity Building availed; accessibility to marketing infrastructures and market information)

Sl. No.	Name of the Farmers Group or Primary Cooperatives	Gender of Chairperson	Gender of Secretary	Gender of Accountant	Training Availed	Accessibility to market infrastructures by types	Types of market information received by the group members
1	Chungnkha Vegetable Production Group	Female	Male	Female	Production techniques	No marketing structure	Current Market Price
2	Bongo WUA	Female	Female	Male	None	No marketing structure	Market price
3	Dungna Tshesay Tshogpa	Male	Male	Male	None	None	None
4	Bachu Vegetable grower group	Female	Female	Female	Vegetable production	None	None
5	Bachu irrigation scheme	None	None	None	None	NA	NA
6	Cheyul irrigation scheme	None	None	None	None	NA	NA
7	Phutsha irrigation scheme	None	None	None	None	NA	NA
8	Trashigang irrigation scheme	None	None	None	None	NA	NA
9	Daga irrigation scheme	None	None	None	None	NA	NA
10	Kuenphen Water User Group	Male	Male	Female	None	NA	NA
11	Pekatshey Road User Group	Male	Male	Male	None	NA	NA
12	Burkhey Road User Group	Male	Male	Male	None	NA	NA
13	Pekatshey WUA	Male	Male	Male	None	NA	NA
14	Yongsibi Sonam Detshen	Female	Female	Female	Seed selection & PHT in Maize, mung dal / PHT in mustard / usage of bio-pesticides / winter chilli production / vegetbale production using drip irrigation	None	Current Market Price
15	Thuenpaphenzhe Vegetable Group	Male	Male	Male	same as above	None	Current Market Price
16	Tshamkanang Vegetable Group	Male	Male	Male	same as above	None	Current Market Price
17	Ugyencholing Vegetable Group	Male	Male	Male	same as above	None	Current Market Price
18	Ayebumtang Vegetable Group	Female	Female	Female	same as above	None	Current Market Price

Sl. No.	Name of the Farmers Group or Primary Cooperatives	Gender of Chairperson	Gender of Secretary	Gender of Accountant	Training Availed	Accessibility to market infrastructures by types	Types of market information received by the group members
19	Drukjeygang Aumtshu Detshen	Male	Female	Female	same as above	They use RNR-EC as marketing infrastructure	Current Market Price
20	Patala to Pangna irrigation channel	Female	Female	Male	None	NA	NA
21	Thangna to Pnagna irrigation channel	Male	Male	Female	None	NA	NA
22	Dalithang Water user group	male	Female	male	Book keeping,Record keeping and account details	NA	NA
23	Kana Basu Yuwa	Male	male	Male	None	NA	NA
24	Nindukha	Male	Male	Male	None	NA	NA
25	Chunabi Yuwa	Male	Male	Male	None	NA	NA
26	Road User group	male	male	Female	Book keeping,Record keeping and account details	NA	NA
27	Karmaling Irrigation Channel	Male	Male	Male	None	NA	NA
28	Dorjiphu Irrigation Channel	Male	Male	Female	None	NA	NA
29	Jamathang Irrigation Channel	None	None	None	None	NA	NA
30	sampang irrigation	Male	None	None	None	NA	NA
31	farmgoan irrigation channel	Male	None	None	None	NA	NA
32	Majigoan irrigation channel	Male	None	None	None	NA	NA
33	Sibsoney irrigation channel	Male	None	None	None	NA	NA
34	Chagay irrigation channel	Male	None	None	None	NA	NA
35	Nawtaley irrigation channel	Male	None	None	None	NA	NA
36	Baleytar irrigation channel	Male	None	None	None	NA	NA
37	Bichgaon Irrigation Channel	Male	Male	None	None	NA	NA
38	Gangatey Irrigation Channel	Male	Male	None	None	NA	NA
39	Dramzekesa Irrigation Channel	Male	Male	None	None	NA	NA
40	Yangtsena Irrigation user group	Male	Male	Female	None	NA	NA
41	Nobgang Sanam Dechen	Male	Female	Male	None	None	None
42	Nobgang Vegetable production	Male	Female	Male	Vegetable production	None	None
43	Langpa-Nobgang Road user group	Male	Male	Male	None	NA	NA
44	Dangreyboo Nagang Sonam Magyel Sanam Ngaelay tshogpa	Male	Male	Male	None	NA	NA

Sl. No.	Name of the Farmers Group or Primary Cooperatives	Gender of Chairperson	Gender of Secretary	Gender of Accountant	Training Availed	Accessibility to market infrastructures by types	Types of market information received by the group members
45	Melong gang Thulogang Saving group	Male	Male	Male	None	NA	NA
46	Upper Somlachin	Male	Male	Male	None	NA	NA
47	Dogap	Male	Male	Male	None	NA	NA
48	Birkulo	Female	Male	Male	None	NA	NA
49	Lapchagoan	Male	Male	Male	None	NA	NA
50	Lumbay	Male	Male	Male	None	NA	NA
51	Damphuchen	Male	Male	Male	None	NA	NA
52	Dapper Vegetable Production Group	Female	Female	Female	None	Samste and Norbugang towns	None
53	Kirney Vegetable Production Group	Male	Male	Female	None	None	None
54	Dipujora Vegetable production Group	Male	Female	Male	None	None	None
55	Tharay Khola Irrigation channel (yangpelthang)	Male	Female	Male	None	NA	NA
56	Dampheling Nga Vegetable Group	Male	Male	Male	None	None	None
57	Dephelling Kha vegetable group	Have not elected	None	None	None	None	None
58	Khangzangling farm road user group	Have not elected	None	None	None	NA	NA
59	Nidupling farm road user group	Male	Male	Male	None	NA	NA
60	Nidupling Saga Gongphel Tshogpa	Male	Male	Male	None	None	None
61	Namsheling farm road user group	Male	Male	Male	None	NA	NA
62	Chungthung A farm road user group	Male	Male	Male	None	NA	NA
63	Chuthung B farm road user group	Male	Male	Female	None	NA	NA
64	Pamzing vegetable production group	Male	Male	Male	Vegetable production	None	None
65	Beachgoan vegetable production group	Male	Male	Male	Vegetable production	None	None
66	Hirangtar vegetable production group	Male	Male	Male	Vegetable production	None	None
67	Khempadara vegetable production group	Male	Male	Male	Vegetable production	None	None
68	Nawleygoan vegetable production	Male	Male	Male	Vegetable production	None	None

Sl. No.	Name of the Farmers Group or Primary Cooperatives	Gender of Chairperson	Gender of Secretary	Gender of Accountant	Training Availed	Accessibility to market infrastructures by types	Types of market information received by the group members
	group						
69	Malabasey vegetable production group	Male	Male	Male	Vegetable production	None	None
70	Dhupidhara vegetable production group	Male	Male	Male	Vegetable production	None	None
71	Simzee vegetable production group	Male	Male	Male	Vegetable production	None	None
72	Titiring hatibar electric fencing user group	Male	Male	Male	Electric fencing maintenance and use	NA	NA
73	Damjangsha electric fencing user group	Male	Male	Male	Electric fencing maintenance and use	NA	NA
74	Panbari electric fencing user group	Male	Male	Male	Electric fencing maintenance and use	NA	NA
75	Huluna electric fencing user group	Male	Male	Male	Electric fencing maintenance and use	NA	NA
76	Norjangsha pipeline irrigation user group	Male	Male	Male	None	NA	NA
77	Damjangsha rain water harvesting group	Male	Male	Male	None	NA	NA
78	Tenpaling water harvesting group	Male	Male	Male	None	NA	NA
79	Barbhotey road user group	Male	Male	Male	None	NA	NA
80	Kungaling Cardamom Group	Female	Female	Male	None	None	Current Market Price
81	Kuchin Cardamom Group	Male	Male	Male	None	None	Current Market Price
82	Kachin Cardamom Group	Male	Male	Male	None	None	Current Market Price
83	Yargay Organic Farming Group	Male	Male	None	None	None	Current Market Price
84	Eto Meto Detshen	Male	Male	None	None	None	Current Market Price
85	Chungthangna Alangi Detshen	Female	Male	None	None	None	Current Market Price
86	Bindup Sonam Detshen	Male	Male	None	None	None	Current Market Price

Sl. No.	Name of the Farmers Group or Primary Cooperatives	Gender of Chairperson	Gender of Secretary	Gender of Accountant	Training Availed	Accessibility to market infrastructures by types	Types of market information received by the group members
87	Tendruk Vegetable group	Male	Female	None	None	Sunday markets	Current Market Price
88	Jumsa water user group	Male	Male	Male	None	NA	NA
89	Gakidling vegetable group	Male	Male	Female	Vegetable Cultivation	Small market shed	None
90	Gakidling water user group	Male	Male	Male	None	None	None
91	Gatemkha vegetable group	Female	Female	Female	Vegetable Cultivation	Small market shed	None
92	Sangkha vegetable group	Male	Male	Male	Vegetable Cultivation	Small market shed	None
93	Rilangthang vegetable group	Male	Male	Male	Vegetable Cultivation	Small market shed	None
94	Gakidling WUA	Female	Female	Female	None	NA	NA
95	Shompangkha vegetable marketing group	Male	Male	Male	ginger pests and diseases management / vegetable production	sarpang Sunday market	None
96	Pemacholing Rangzhin Sonam Tshongdrel Detshen	Male	Male	Male	Ginger culti, fruits tree management	Gelephu FCBL	Current Market Price
97	Yeozergang Rangzin Sonam Sonam Tshongdrel Detshen	Male	Male	Female	Mass vegetable cultivation	Gelephu FCBL	Current Market Price
98	Tashicholing Rangzin Sonam Tshongdrel Detshen	Female	Female	Male	Mass vegetable cultivation	Gelephu FCBL	Current Market Price

Source: FSAPP Gewog Agriculture Extension Officers (Note: NA- means Not Applicable)

Table 4: Count of Farmers Groups and Cooperatives by Functionalities (Nature of Activities) and by the Gewogs

Gewogs	Vegetable Production	Cardamom Production	Ginger Production	Organic Buckwheat Production	Group Savings	Irrigation water use and maintenance	Road user and maintenance	Electric fencing user and maintenance	Total
Bongo	1	0	0	0	0	1	0	0	2
Dungna	1	0	0	0	0	0	0	0	1
Getana	1	0	0	0	0	5	0	0	6
Metakha	0	0	0	0	0	1	0	0	1
Sampheling	0	0	0	0	0	1	2	0	3
Drujeygang	6	0	0	0	0	2	0	0	8
Kana	0	0	0	0	0	4	1	0	5
Karmaling	0	0	0	0	0	3	0	0	3
Lhamoizingkha	0	0	0	0	0	7	0	0	7
Nichula	0	0	0	0	0	3	0	0	3
Gakiling	0	0	0	0	0	1	0	0	1
Samar	1	0	0	1	0	0	1	0	3
Dophuchen	0	0	0	0	2	6	0	0	8
Norbugang	3	0	0	0	0	1	0	0	4
Sangngagcholing	2	0	1	0	0	0	5	0	8
Tading	8	0	0	0	0	3	1	4	16
Tendruk	1	7	0	0	0	1	0	0	9
Gakidling	5	0	0	0	0	1	0	0	6
Shompangkha	1	0	0	0	0	0	0	0	1
Tareythang	3	0	0	0	0	0	0	0	3
Total	33	7	1	1	2	40	10	4	98

Source: FSAPP Baseline Household Survey, Oct – Nov, 2018, Bhutan Consulting Associates

Table 5: Count and percentage of respondents with their functionalities as office bearers of FGs and CooPs by Dzongkhags

Gender of the member	**Count and %**	Dzongkhag					Total	% out of members
		Samtse	Haa	Chhukha	Sarpang	Dagana		
Chair	Count	6	0	8	6	6	26	5.3
	% in Dzkg	1.0%	0.0%	1.6%	1.2%	1.1%	1.1%	
Secretary	Count	0	0	6	4	2	12	2.4
	% in Dzkg	0.0%	0.0%	1.2%	0.8%	0.4%	0.5%	
Treasurer	Count	1	0	3	5	15	24	4.8
	% in Dzkg	0.2%	0.0%	0.6%	1.0%	2.8%	1.0%	
As member only	Count	136	7	58	139	91	431	87.1
	% in Dzkg	21.9%	2.2%	11.4%	28.7%	17.1%	17.5%	
Not a member of any FGs or CooPs	Count	479	314	434	331	418	1976	
	% in Dzkg	77.0%	97.8%	85.3%	68.2%	78.6%	80.0%	
Total	Count	622	321	509	485	532	2469	495

Source: FSAPP Baseline Household Survey, Oct – Nov, 2018, Bhutan Consulting Associates

Table 6: Count and percentage of respondents with types of awareness / trainings availed as member of Farmers Groups or Cooperatives by Dzongkhags

Types of Trainings / awareness	**Count and %**	Dzongkhag					Total	
		Samtse	Haa	Chhukha	Sarpang	Dagana	Count	% of total
Benefits of working in group	Count	131	5	74	109	84	403	16.3
	% within Dzkg	21.1%	1.6%	14.5%	22.5%	15.8%		
Group fund accumulation	Count	122	2	57	39	24	244	9.9
	% within Dzkg	19.6%	0.6%	11.2%	8.0%	4.5%		
Need to have By-laws	Count	99	1	53	59	28	240	9.7
	% within Dzkg	15.9%	0.3%	10.4%	12.2%	5.3%		
Technical trainings on production	Count	27	4	33	34	16	114	4.6
	% within Dzkg	4.3%	1.2%	6.5%	7.0%	3.0%		
Post harvest packaging	Count	8	0	8	9	19	44	1.8
	% within Dzkg	1.3%	0.0%	1.6%	1.9%	3.6%		
Processing the products	Count	7	2	9	20	25	63	2.6
	% within Dzkg	1.1%	0.6%	1.8%	4.1%	4.7%		
Safe handling (equipment / machineries)	Count	6	1	25	33	25	90	3.6
	% within Dzkg	1.0%	0.3%	4.9%	6.8%	4.7%		
Book keeping	Count	7	1	27	16	26	77	3.1
	% within Dzkg	1.1%	0.3%	5.3%	3.3%	4.9%		
Leadership & management	Count	6	4	14	19	17	60	2.4
	% within Dzkg	1.0%	1.2%	2.8%	3.9%	3.2%		
Exposure trips	Count	1	1	10	2	7	21	0.9
	% within Dzkg	0.2%	0.3%	2.0%	0.4%	1.3%		
Irrigation scheme management	Count	4	1	6	15	14	40	1.6
	% within Dzkg	0.6%	0.3%	1.2%	3.1%	2.6%		
Market information	Count	8	5	7	33	35	88	3.6
	% within Dzkg	1.3%	1.6%	1.4%	6.8%	6.6%		
Not a member of any FGs or CooPs	Count	479	314	434	331	418	1976	80.0
	% within Dzkg	77.0%	97.8%	85.3%	68.2%	78.6%		
Total	Count	622	321	509	485	532	2469	100.0

Source: FSAPP Baseline Household Survey, Oct – Nov, 2018, Bhutan Consulting Associates

Table 7: Irrigation Water User Association / Groups having assured Irrigation facilities for FSAPP Gewogs till December 2017

S. No.	Name of the Water User Groups (here list all existing WUAs even if they don't have assured irrigation facilities)	Location (village)	Gewog	Dzongkhag	Total Members	Area covered by Assured Flood Irrigation (Acres)	Area covered by Assured Micro Irrigation (Acres)
1	Bongo WUA	Bongo	Bongo	Chhukha	16	125	0
2	Bachu irrigation scheme	Bachu	Getana	Chhukha	20	45.65	0
3	Cheyul irrigation scheme	Cheyul	Getana	Chhukha	32	65.12	0
4	Phutsha irrigation scheme	Phutsha	Getana	Chhukha	26	26.54	0
5	Trashigang irrigation scheme	Trashigang	Getana	Chhukha	12	12.33	0
6	Daga irrigation scheme	Daga	Getana	Chhukha	14	28.35	0
7	Kuenphen Water User Group	Pangu	Metakha	Chhukha	62	80	0
8	Pekatshey WUA	Pekatshey	Sampheling	Chhukha	21	30	0
9	Patala to Pangna irrigation channel	Patala	Drujeygang	Dagana	50	40	0
10	Thangna to Pnagna irrigation channel	Thangna	Drujeygang	Dagana	90	200	0
11	Kana Basu Yuwa	Tangrichu lun	Kana	Dagana	11	25.8	0
12	Nindukha	Damalum	Kana	Dagana	27	76.11	0
13	Chunabi Yuwa	Nadolum	Kana	Dagana	12	18.26	0
14	Karmaling Irrigation Channel	Karmaling	Karmaling	Dagana	88	70	3
15	Dorjiphu Irrigation Channel	Dorjiphu	Karmaling	Dagana	48	40	2
16	Sampang irrigation	farmgoan and Daragoan	Lhamoizingkha	Dagana	45	60	0
17	Farmgoan irrigation channel	farmgoan	Lhamoizingkha	Dagana	20	60	0
18	Majigoan Irrigation channel	Majigoan	Lhamoizingkha	Dagana	40	56	0
19	Sibsoney irrigation channel	Sibsoney	Lhamoizingkha	Dagana	30	70	0
20	Chagay irrigation channel	Devitar	Lhamoizingkha	Dagana	20	68	0
21	Nawtaley irrigation channel	Nawtaley	Lhamoizingkha	Dagana	9	33	0
22	Baleytar irrigation channel	Baleytar	Lhamoizingkha	Dagana	15	18	0
23	Bichgaon Irrigation Channel	Dangribhu	Nichula	Dagana	16	25.38	2
24	Gangatey Irrigation Channel	Damchuna	Nichula	Dagana	18	62.45	1
25	Dramzekesa Irrigation Channel	Dramzekesa	Nichula	Dagana	13	40.97	1
26	Yangtsena	Yangtsena	Gakiling	Haa	11	10.1	0
27	Upper Somlachin	Somlachin	Dophuchen	Samtse	35	60	0
28	Dogap	Dogap	Dophuchen	Samtse	78	65	0
29	Birkulo	Somlachin	Dophuchen	Samtse	26	50	0
30	Lapchagoan	Lapchagoan	Dophuchen	Samtse	24	15	0
31	Lumbay	Lumbay	Dophuchen	Samtse	26	20	0
32	Damphuchen	Maney	Dophuchen	Samtse	47	45	0
33	Damjangsha rain water harvesting group	Damjangsha	Tading	Samtse	21	0	10
34	Tenpaling water harvesting group	Tenpaling	Tading	Samtse	32	0	10
35	Gakidling WUA	Gakidling	Gakidling	Sarpang	67	200	0
				Total	**1122**	**1842.1**	**29**

Source: FSAPP Gewog Agriculture Officers

Annex 3: Production, Marketed Volume and Marketed Value

Table 1: Count and Percentage of Households within Gewog producing Project Targeted Crops by Gewogs (For Nine Crops)

Gewogs	Count and Percent	HHs producing Paddy		HHs producing potato		HHs producing chili		HHs producing cauliflower		HHs producing cabbage		HHs producing beans		HHs producing tomato		HHs producing onion		HHs producing broccoli	
		Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Norbugang	Count	52	36	52	36	49	39	37	51	32	56	56	32	34	54	25	63	18	70
	%	59.1	40.9	59.1	40.9	55.7	44.3	42.0	58.0	36.4	63.6	63.6	36.4	38.6	61.4	28.4	71.6	20.5	79.5
Tendruk	Count	53	86	37	102	84	55	56	83	53	86	97	42	29	110	30	109	36	103
	%	38.1	61.9	26.6	73.4	60.4	39.6	40.3	59.7	38.1	61.9	69.8	30.2	20.9	79.1	21.6	78.4	25.9	74.1
Sangngag choling	Count	90	23	40	73	56	57	35	78	37	76	63	50	52	61	6	107	23	90
	%	79.6	20.4	35.4	64.6	49.6	50.4	31.0	69.0	32.7	67.3	55.8	44.2	46.0	54.0	5.3	94.7	20.4	79.6
Dophuchen	Count	58	75	60	73	99	34	33	100	38	95	94	39	33	100	5	128	24	109
	%	43.6	56.4	45.1	54.9	74.4	25.6	24.8	75.2	28.6	71.4	70.7	29.3	24.8	75.2	3.8	96.2	18.0	82.0
Tading	Count	22	127	107	42	90	59	60	89	62	87	87	62	40	109	42	107	38	111
	%	14.8	85.2	71.8	28.2	60.4	39.6	40.3	59.7	41.6	58.4	58.4	41.6	26.8	73.2	28.2	71.8	25.5	74.5
Gakiling	Count	20	38	18	40	31	27	3	55	2	56	29	29	2	56	1	57	0	58
	%	34.5	65.5	31.0	69.0	53.4	46.6	5.2	94.8	3.4	96.6	50.0	50.0	3.4	96.6	1.7	98.3	0.0	100.0
Sangbaykha	Count	27	40	27	40	47	20	2	65	8	59	31	36	15	52	7	60	2	65
	%	40.3	59.7	40.3	59.7	70.1	29.9	3.0	97.0	11.9	88.1	46.3	53.7	22.4	77.6	10.4	89.6	3.0	97.0
Uesu	Count	0	98	85	13	54	44	14	84	29	69	39	59	11	87	4	94	6	92
	%	0.0	100.0	86.7	13.3	55.1	44.9	14.3	85.7	29.6	70.4	39.8	60.2	11.2	88.8	4.1	95.9	6.1	93.9
Samar	Count	3	95	89	9	42	56	26	72	55	43	49	49	18	80	12	86	8	90
		3.1	96.9	90.8	9.2	42.9	57.1	26.5	73.5	56.1	43.9	50.0	50.0	18.4	81.6	12.2	87.8	8.2	91.8
Bongo	Count	78	43	69	52	89	32	13	108	19	102	80	41	13	108	18	103	7	114
	%	64.5	35.5	57.0	43.0	73.6	26.4	10.7	89.3	15.7	84.3	66.1	33.9	10.7	89.3	14.9	85.1	5.8	94.2
Getana	Count	56	7	43	20	60	3	15	48	30	33	51	12	10	53	6	57	17	46
		88.9	11.1	68.3	31.7	95.2	4.8	23.8	76.2	47.6	52.4	81.0	19.0	15.9	84.1	9.5	90.5	27.0	73.0
Metakha	Count	57	10	61	6	62	5	31	36	48	19	60	7	3	64	3	64	24	43
	%	85.1	14.9	91.0	9.0	92.5	7.5	46.3	53.7	71.6	28.4	89.6	10.4	4.5	95.5	4.5	95.5	35.8	64.2
Dungna	Count	112	26	99	39	133	5	66	72	102	36	118	20	14	124	18	120	53	85
	%	81.2	18.8	71.7	28.3	96.4	3.6	47.8	52.2	73.9	26.1	85.5	14.5	10.1	89.9	13.0	87.0	38.4	61.6
Sampheling	Count	38	82	57	63	68	52	19	101	18	102	46	74	30	90	4	116	15	105
	%	31.7	68.3	47.5	52.5	56.7	43.3	15.8	84.2	15.0	85.0	38.3	61.7	25.0	75.0	3.3	96.7	12.5	87.5
Tareythang	Count	27	25	13	39	35	17	24	28	22	30	27	25	10	42	7	45	17	35
	%	51.9	48.1	25.0	75.0	67.3	32.7	46.2	53.8	42.3	57.7	51.9	48.1	19.2	80.8	13.5	86.5	32.7	67.3
Samtenling	Count	45	52	23	74	55	42	41	56	45	52	57	40	18	79	13	84	33	64
	%	46.4	53.6	23.7	76.3	56.7	43.3	42.3	57.7	46.4	53.6	58.8	41.2	18.6	81.4	13.4	86.6	34.0	66.0
Dekiling	Count	52	91	48	95	82	61	45	98	53	90	84	59	35	108	21	122	34	109
	%	36.4	63.6	33.6	66.4	57.3	42.7	31.5	68.5	37.1	62.9	58.7	41.3	24.5	75.5	14.7	85.3	23.8	76.2
Shompang kha	Count	15	86	43	58	56	45	32	69	40	61	49	52	31	70	13	88	25	76
	%	14.9	85.1	42.6	57.4	55.4	44.6	31.7	68.3	39.6	60.4	48.5	51.5	30.7	69.3	12.9	87.1	24.8	75.2
Gakidling	Count	51	41	38	54	52	40	59	33	58	34	50	42	33	59	19	73	43	49
	%	55.4	44.6	41.3	58.7	56.5	43.5	64.1	35.9	63.0	37.0	54.3	45.7	35.9	64.1	20.7	79.3	46.7	53.3

Kana	Count	88	31	34	85	70	49	24	95	29	90	64	55	9	110	27	92	15	104
	%	73.9	26.1	28.6	71.4	58.8	41.2	20.2	79.8	24.4	75.6	53.8	46.2	7.6	92.4	22.7	77.3	12.6	87.4
Drujeygang	Count	46	94	15	125	76	64	18	122	13	127	60	80	5	135	11	129	8	132
	%	32.9	67.1	10.7	89.3	54.3	45.7	12.9	87.1	9.3	90.7	42.9	57.1	3.6	96.4	7.9	92.1	5.7	94.3
Lhamoizing kha	Count	72	45	25	92	27	90	2	115	8	109	24	93	16	101	3	114	2	115
	%	61.5	38.5	21.4	78.6	23.1	76.9	1.7	98.3	6.8	93.2	20.5	79.5	13.7	86.3	2.6	97.4	1.7	98.3
Nichula	Count	49	10	39	20	41	18	8	51	7	52	19	40	25	34	4	55	5	54
	%	83.1	16.9	66.1	33.9	69.5	30.5	13.6	86.4	11.9	88.1	32.2	67.8	42.4	57.6	6.8	93.2	8.5	91.5
Karmaling	Count	55	42	26	71	41	56	14	83	18	79	35	62	16	81	4	93	9	88
	%	56.7	43.3	26.8	73.2	42.3	57.7	14.4	85.6	18.6	81.4	36.1	63.9	16.5	83.5	4.1	95.9	9.3	90.7
Total	Count	1166	1303	1148	1321	1499	970	677	1792	826	1643	1369	1100	502	1967	303	2166	462	2007
	%	47.2	52.8	46.5	53.5	60.7	39.3	27.4	72.6	33.5	66.5	55.4	44.6	20.3	79.7	12.3	87.7	18.7	81.3

Source: FSAPP Baseline Household Survey, Oct – Nov, 2018, Bhutan Consulting Associates

Table 2: Count and Percentage of Households within Gewog producing Project Targeted Crops by Gewogs (For Eight Crops)

Gewogs	Count and Percent	HHs producing carrot		HHs producing Pea		HHs producing green leafy vegetables		HHs producing ginger		HHs producing pepper		HHs producing quinoa		HHs producing citrus		HHs producing cardamom	
		Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Norbugang	Count	15	73	7	81	66	22	32	56	4	84	4	84	11	77	28	60
	%	17.0	83.0	8.0	92.0	75.0	25.0	36.4	63.6	4.5	95.5	4.5	95.5	12.5	87.5	31.8	68.2
Tendruk	Count	25	114	19	120	115	24	36	103	0	139	10	129	1	138	93	46
	%	18.0	82.0	13.7	86.3	82.7	17.3	25.9	74.1	0.0	100.0	7.2	92.8	0.7	99.3	66.9	33.1
Sangngag choling	Count	12	101	17	96	87	26	32	81	2	111	1	112	3	110	53	60
	%	10.6	89.4	15.0	85.0	77.0	23.0	28.3	71.7	1.8	98.2	0.9	99.1	2.7	97.3	46.9	53.1
Dophuchen	Count	20	113	13	120	119	14	57	76	0	133	3	130	23	110	112	21
	%	15.0	85.0	9.8	90.2	89.5	10.5	42.9	57.1	0.0	100.0	2.3	97.7	17.3	82.7	84.2	15.8
Tading	Count	23	126	23	126	135	14	52	97	3	146	4	145	11	138	85	64
	%	15.4	84.6	15.4	84.6	90.6	9.4	34.9	65.1	2.0	98.0	2.7	97.3	7.4	92.6	57.0	43.0
Gakiling	Count	8	50	2	56	31	27	10	48	0	58	0	58	0	58	45	13
	%	13.8	86.2	3.4	96.6	53.4	46.6	17.2	82.8	0.0	100.0	0.0	100.0	0.0	100.0	77.6	22.4
Sangbay kha	Count	8	59	9	58	37	30	4	63	0	67	0	67	0	67	57	10
	%	11.9	88.1	13.4	86.6	55.2	44.8	6.0	94.0	0.0	100.0	0.0	100.0	0.0	100.0	85.1	14.9
Uesu	Count	34	64	28	70	59	39	0	98	0	98	1	97	0	98	0	98
	%	34.7	65.3	28.6	71.4	60.2	39.8	0.0	100.0	0.0	100.0	1.0	99.0	0.0	100.0	0.0	100.0
Samar	Count	37	61	41	57	56	42	0	98	0	98	1	97	0	98	0	98
	%	37.8	62.2	41.8	58.2	57.1	42.9	0.0	100.0	0.0	100.0	1.0	99.0	0.0	100.0	0.0	100.0
Bongo	Count	17	104	3	118	99	22	58	63	0	121	4	117	5	116	77	44
	%	14.0	86.0	2.5	97.5	81.8	18.2	47.9	52.1	0.0	100.0	3.3	96.7	4.1	95.9	63.6	36.4
Getana	Count	23	40	4	59	59	4	33	30	0	63	0	63	9	54	55	8
	%	36.5	63.5	6.3	93.7	93.7	6.3	52.4	47.6	0.0	100.0	0.0	100.0	14.3	85.7	87.3	12.7
Metakha	Count	30	37	10	57	65	2	40	27	0	67	0	67	3	64	56	11
	%	44.8	55.2	14.9	85.1	97.0	3.0	59.7	40.3	0.0	100.0	0.0	100.0	4.5	95.5	83.6	16.4

Dungna	Count	38	100	9	129	129	9	82	56	0	138	0	138	3	135	130	8
	%	27.5	72.5	6.5	93.5	93.5	6.5	59.4	40.6	0.0	100.0	0.0	100.0	2.2	97.8	94.2	5.8
Sampheling	Count	4	116	6	114	104	16	80	40	0	120	3	117	10	110	59	61
	%	3.3	96.7	5.0	95.0	86.7	13.3	66.7	33.3	0.0	100.0	2.5	97.5	8.3	91.7	49.2	50.8
Tareythang	Count	9	43	4	48	28	24	39	13	0	52	0	52	0	52	0	52
	%	17.3	82.7	7.7	92.3	53.8	46.2	75.0	25.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
Samtenling	Count	10	87	6	91	45	52	29	68	0	97	0	97	3	94	18	79
	%	10.3	89.7	6.2	93.8	46.4	53.6	29.9	70.1	0.0	100.0	0.0	100.0	3.1	96.9	18.6	81.4
Dekiling	Count	5	138	6	137	90	53	45	98	0	143	0	143	13	130	7	136
	%	3.5	96.5	4.2	95.8	62.9	37.1	31.5	68.5	0.0	100.0	0.0	100.0	9.1	90.9	4.9	95.1
Shompang kha	Count	14	87	11	90	50	51	20	81	0	101	0	101	18	83	18	83
	%	13.9	86.1	10.9	89.1	49.5	50.5	19.8	80.2	0.0	100.0	0.0	100.0	17.8	82.2	17.8	82.2
Gakidling	Count	18	74	14	78	47	45	13	79	1	91	0	92	7	85	15	77
	%	19.6	80.4	15.2	84.8	51.1	48.9	14.1	85.9	1.1	98.9	0.0	100.0	7.6	92.4	16.3	83.7
Kana	Count	15	104	9	110	52	67	36	83	1	118	0	119	19	100	62	57
	%	12.6	87.4	7.6	92.4	43.7	56.3	30.3	69.7	0.8	99.2	0.0	100.0	16.0	84.0	52.1	47.9
Drujeygang	Count	4	136	0	140	62	78	35	105	1	139	0	140	25	115	58	82
	%	2.9	97.1	0.0	100.0	44.3	55.7	25.0	75.0	0.7	99.3	0.0	100.0	17.9	82.1	41.4	58.6
Lhamoizing kha	Count	1	116	1	116	58	59	8	109	0	117	3	114	1	116	2	115
	%	0.9	99.1	0.9	99.1	49.6	50.4	6.8	93.2	0.0	100.0	2.6	97.4	0.9	99.1	1.7	98.3
Nichula	Count	6	53	3	56	43	16	4	55	0	59	1	58	0	59	0	59
	%	10.2	89.8	5.1	94.9	72.9	27.1	6.8	93.2	0.0	100.0	1.7	98.3	0.0	100.0	0.0	100.0
Karmaling	Count	2	95	4	93	48	49	9	88	0	97	1	96	4	93	8	89
	%	2.1	97.9	4.1	95.9	49.5	50.5	9.3	90.7	0.0	100.0	1.0	99.0	4.1	95.9	8.2	91.8
Total	Count	378	2091	249	2220	1684	785	754	1715	12	2457	36	2433	169	2300	1038	1431
	%	15.3	84.7	10.1	89.9	68.2	31.8	30.5	69.5	0.5	99.5	1.5	98.5	6.8	93.2	42.0	58.0

Source: FSAPP Baseline Household Survey, Oct – Nov, 2018, Bhutan Consulting Associates

Table 3: Summary of the Analysis on Production, Marketed Volume and Value

Production And Marketed Value	RICE	POTATO	CHILLI	C/FLOWER	CABBAGE	BEANS	TOMATO	ONNION	BROCOLLI
SAMPLED PRODUCTIONS (30.77%)	638094.6	416455	78459.2	32788	97138.5	66015	19986	8621.5	12543.5
TOTAL PRODUCTION (100%)	2,073,756	1,966,103	254,986	106,558	315,692	214,543	64,953	28,019	40,765
VOLUME OF PRODUCE MARKETED	130,367	1,353,445	106,354	62,873	220,916	111,771	36,558	10,998	14,553
PERCENTAGE OF PRODUCE MARKETED	6%	69%	42%	59%	70%	52%	56%	39%	36%
AVG. PRICE OF MARKETED PRODUCE	46.67	27.51	120.89	40.27	29.43	46.38	27.20	45.00	43.56
MONEY VALUE OF PRODUCTS MARKETED	6,084,400	37,233,270	12,856,653	2,531,702	6,501,396	5,183,451	994,489	494,898	633,914
VALUE IN MILLION (NU.)	6.08	37.23	12.86	2.53	6.50	5.18	0.99	0.49	0.63

Production And Marketed Value	CARROT	PEA	G. LEAF VEG	GINGER	BLK PEPPER	QUINOA	CITRUS	CARDAMAM	Total
SAMPLED PRODUCTIONS (30.77%)	29541.5	18732	114915	150673	7.1	1230.6	32797	104408.7	
TOTAL PRODUCTION (100%)	96,007	60,877	373,464	489,675	23	3,999	106,588	339,320	6,535,331
VOLUME OF PRODUCE MARKETED	47,410	33,757	130,003	390,916	-	2,385	103,926	321,746	3,077,979
PERCENTAGE OF PRODUCE MARKETED	49%	55%	35%	80%	0%	60%	98%	95%	901%
AVG. PRICE OF MARKETED PRODUCE	28.19	45.12	45.12	36.34	-	93.67	158.69	592.31	1,426
MONEY VALUE OF PRODUCTS MARKETED	1,336,553	1,523,153	5,865,904	14,205,540	-	223,436	16,491,742	190,574,646	302,735,145
VALUE IN MILLION (NU.)	1.34	1.52	5.87	14.21	-	0.22	16.49	190.57	302.74

Total Value of Marketed Products 302.74 MILLION

Source: FSAPP Baseline Household Survey, Oct – Nov, 2018, Bhutan Consulting Associates

Table 4: Analysis on Production volume, Marketed Volume, and Marketed Value by the project targeted crops

Sources for all tables in this section: *FSAPP Baseline Household Survey, Oct – Nov, 2018, Bhutan Consulting Associates*

Paddy

Sl.No	Analysis	Sample (30.77%)	Entire (100%)
1	Productions of Paddy	1,063,491.00	3,456,259.34
2	Proportion of paddy to Rice (60%)	638,094.60	2,073,755.61
3	Quantity of rice marketed	40,114.00	130,367.24
4	Average price per Kg	46.67	46.67
5	**TOTAL VALUE OF MARKETED PRODUCTS**	**1,872,169.84**	**6,084,399.86**
6	TOTAL VALUE OF MARKETED PRODUCTS IN MILLION (Nu)	1.87	6.08
7	**PERCENTAGE OF SALES ON TOTAL PRODUCTIONS**	**6%**	**6%**

Potato

Sl.No	Analysis	Sample (30.77%)	Entire (100%)
1	Productions of Paddy	604,970.00	1,966,103.35
2	Quantity of Potato marketed	416,455.00	1,353,444.91
3	Average price per Kg	27.51	27.51
4	**TOTAL VALUE OF MARKETED PRODUCTS**	**11,456,677.05**	**37,233,269.58**
5	TOTAL VALUE OF MARKETED PRODUCTS IN MILLION (Nu)	11.46	37.23
6	**PERCENTAGE OF SALES ON TOTAL PRODUCTIONS**	**69%**	**69%**

Chilli

Sl.No	Analysis	Sample (30.77%)	Entire (100%)
1	Productions	78,459.20	254,986.03
2	Quantity marketed	32,725.00	106,353.59
3	Average price per Kg	120.89	120.89
4	**TOTAL VALUE OF MARKETED PRODUCTS**	**3,955,992.11**	**12,856,652.94**
5	TOTAL VALUE OF MARKETED PRODUCTS IN MILLION (Nu)	3.96	12.86
6	**PERCENTAGE OF SALES ON TOTAL PRODUCTIONS**	**42%**	**42%**

Cauliflower

Sl.No	Analysis	Sample (30.77%)	Entire (100%)
1	Productions	32,788.00	106,558.34
2	Quantity marketed	19,346.00	62,872.93
3	Average price per Kg	40.27	40.27
4	**TOTAL VALUE OF MARKETED PRODUCTS**	**779,004.77**	**2,531,702.21**
5	TOTAL VALUE OF MARKETED PRODUCTS IN MILLION (Nu)	0.78	2.53
6	**PERCENTAGE OF SALES ON TOTAL PRODUCTIONS**	**59%**	**59%**

Cabbage

Sl.No	Analysis	Sample (30.77%)	Entire (100%)
1	Productions	97,138.50	315,692.23
2	Quantity marketed	67,976.00	220,916.48
3	Average price per Kg	29.43	29.43
4	**TOTAL VALUE OF MARKETED PRODUCTS**	**2,000,479.54**	**6,501,395.97**
5	TOTAL VALUE OF MARKETED PRODUCTS IN MILLION (Nu)	2.00	6.50
6	**PERCENTAGE OF SALES ON TOTAL PRODUCTIONS**	**70%**	**70%**

Beans

Sl.No	Analysis	Sample (30.77%)	Entire (100%)
1	Productions	66,015.00	214,543.39
2	Quantity marketed	34,392.00	111,771.21
3	Average price per Kg	46.38	46.38
4	**TOTAL VALUE OF MARKETED PRODUCTS**	**1,594,947.77**	**5,183,450.68**
5	TOTAL VALUE OF MARKETED PRODUCTS IN MILLION (Nu)	1.59	5.18
6	**PERCENTAGE OF SALES ON TOTAL PRODUCTIONS**	**52%**	**52%**

Tomato

Sl.No	Analysis	Sample (30.77%)	Entire (100%)
1	Productions	19,986.00	64,952.88
2	Quantity marketed	11,249.00	36,558.34
3	Average price per Kg	27.20	27.20
4	**TOTAL VALUE OF MARKETED PRODUCTS**	**306,004.27**	**994,489.00**
5	TOTAL VALUE OF MARKETED PRODUCTS IN MILLION (Nu)	0.31	0.99
6	**PERCENTAGE OF SALES ON TOTAL PRODUCTIONS**	**56%**	**56%**

Onion (Bulb)

Sl.No	Analysis	Sample (30.77%)	Entire (100%)
1	Productions	8,621.50	28,019.17
2	Quantity marketed	3,384.00	10,997.73
3	Average price per Kg	45.00	45.00
4	**TOTAL VALUE OF MARKETED PRODUCTS**	**152,280.00**	**494,897.63**
5	TOTAL VALUE OF MARKETED PRODUCTS IN MILLION (Nu)	0.15	0.49
6	**PERCENTAGE OF SALES ON TOTAL PRODUCTIONS**	**39%**	**39%**

Brocolli

Sl.No	Analysis	Sample (30.77%)	Entire (100%)
1	Productions	12,543.50	40,765.36
2	Quantity marketed	4,478.00	14,553.14
3	Average price per Kg	43.56	43.56
4	**TOTAL VALUE OF MARKETED PRODUCTS**	**195,055.23**	**633,913.63**
5	TOTAL VALUE OF MARKETED PRODUCTS IN MILLION (Nu)	0.20	0.63
6	**PERCENTAGE OF SALES ON TOTAL PRODUCTIONS**	**36%**	**36%**

Carrot

Sl.No	Analysis	Sample (30.77%)	Entire (100%)
1	Productions	29,541.50	96,007.47
2	Quantity marketed	14,588.00	47,409.81
3	Average price per Kg	28.19	28.19
4	**TOTAL VALUE OF MARKETED PRODUCTS**	**411,257.45**	**1,336,553.29**
5	TOTAL VALUE OF MARKETED PRODUCTS IN MILLION (Nu)	0.41	1.34
6	**PERCENTAGE OF SALES ON TOTAL PRODUCTIONS**	**49%**	**49%**

Pea

Sl.No	Analysis	Sample (30.77%)	Entire (100%)
1	Productions	18,732.00	60,877.48
2	Quantity marketed	10,387.00	33,756.91
3	Average price per Kg	45.12	45.12
4	**TOTAL VALUE OF MARKETED PRODUCTS**	**468,674.03**	**1,523,152.52**
5	TOTAL VALUE OF MARKETED PRODUCTS IN MILLION (Nu)	0.47	1.52
6	**PERCENTAGE OF SALES ON TOTAL PRODUCTIONS**	**55%**	**55%**

Green Leafy Vegetables

Sl.No	Analysis	Sample (30.77%)	Entire (100%)
1	Productions	114,915.00	373,464.41
2	Quantity marketed	40,002.00	130,003.25
3	Average price per Kg	45.12	45.12
4	**TOTAL VALUE OF MARKETED PRODUCTS**	**1,804,938.73**	**5,865,904.22**
5	TOTAL VALUE OF MARKETED PRODUCTS IN MILLION (Nu)	1.80	5.87
6	**PERCENTAGE OF SALES ON TOTAL PRODUCTIONS**	**35%**	**35%**

Ginger

Sl.No	Analysis	Sample (30.77%)	Entire (100%)
1	Productions	150,673.00	489,675.01
2	Quantity marketed	120,285.00	390,916.48
3	Average price per Kg	36.34	36.34
4	**TOTAL VALUE OF MARKETED PRODUCTS**	**4,371,044.59**	**14,205,539.79**
5	TOTAL VALUE OF MARKETED PRODUCTS IN MILLION (Nu)	4.37	14.21
6	**PERCENTAGE OF SALES ON TOTAL PRODUCTIONS**	**80%**	**80%**

Black Pepper

Sl.No	Analysis	Sample (30.77%)	Entire (100%)
1	Productions	7.10	23.07
2	Quantity marketed		
3	Average price per Kg		
4	**TOTAL VALUE OF MARKETED PRODUCTS**		
5	TOTAL VALUE OF MARKETED PRODUCTS IN MILLION (Nu)		
6	**PERCENTAGE OF SALES ON TOTAL PRODUCTIONS**		

Quinoa

Sl.No	Analysis	Sample (30.77%)	Entire (100%)
1	Productions	1,230.60	3,999.35
2	Quantity marketed	734.00	2,385.44
3	Average price per Kg	93.67	93.67
4	**TOTAL VALUE OF MARKETED PRODUCTS**	**68,751.33**	**223,436.25**
5	TOTAL VALUE OF MARKETED PRODUCTS IN MILLION (Nu)	0.07	0.22
6	**PERCENTAGE OF SALES ON TOTAL PRODUCTIONS**	**60%**	**60%**

Citrus

Sl.No	Analysis	Sample (30.77%)	Entire (100%)
1	Productions	32,797.00	106,587.59
2	Quantity marketed	31,978.00	103,925.90
3	Average price per Pons	158.69	158.69
4	**TOTAL VALUE OF MARKETED PRODUCTS**	**5,074,508.88**	**16,491,741.55**
5	TOTAL VALUE OF MARKETED PRODUCTS IN MILLION (Nu)	5.07	16.49
6	**PERCENTAGE OF SALES ON TOTAL PRODUCTIONS**	**98%**	**98%**

Large Cardamom

Sl.No	Analysis	Sample (30.77%)	Entire (100%)
1	Productions	104,408.70	339,319.79
2	Quantity marketed	99,001.20	321,745.86
3	Average price per Pons	592.31	592.31
4	**TOTAL VALUE OF MARKETED PRODUCTS**	**58,639,818.66**	**190,574,646.28**
5	TOTAL VALUE OF MARKETED PRODUCTS IN MILLION (Nu)	58.64	190.57
6	**PERCENTAGE OF SALES ON TOTAL PRODUCTIONS**	**95%**	**95%**

Annex 4: Gewog wise Area under Assured Irrigation Facilities for the Project Targeted Crops

Gewogs Þ		Bongo		Dungna		Getana		Metakha		Sampheling		Drujeygang		Kana		Karmaling	
Serial No.	**Crops**	**A***	**B****	**A**	**B**	**A**	**B**	**A**	**B**	**A**	**B**	**A**	**B**	**A**	**B**	**A**	**B**
1	Paddy	630	0	141	0	178	0	145	0	40	0	150	0	758	0	120	0
2	Potato	350	0	0	0	0	0	0	0	8	0	0	0	0	46.5	0	0
3	Vegetables	145	0	0	0	0	0	15	0	5	3	20	3.5	0	554.9	7	3
4	Large Cardamom	730	0	0	0	0	0	88	0	10	0	20	0	0	50	0	0
5	Citrus	124	0	0	25	0	0	1	0	5	0	60	1	0	340.9	0	0
6	Quinoa	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	Ginger	98	0	0	0	0	0	0	0	0	0	0	0	0	5.15	0	0
8	Black pepper	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Gewogs Þ		Lhamoizingkha		Nichula		Gakiling		Samar		Uesu		Sangbaykha		Dophuchen		Norbugang	
Serial No.	**Crops**	**A**	**B**	**A**	**B**	**A**	**B**	**A**	**B**	**A**	**B**	**A**	**B**	**A**	**B**	**A**	**B**
1	Paddy	0	0	154.5	0	54	0	1.2	0	0	0	35	0	350	0	877	0
2	Potato	0	0	0	0	0	0	0	0	0	0	1.5	2	0	0	240	0
3	Vegetables	**0**	12.7	0	20	0	0	0	0	0	0	4.5	5	0	0	120	30
4	Large Cardamom	0	0	0	0	0	0	0	0	0	0	0	90	0	0	0	0
5	Citrus	0	0	0	0	0	0	0	0	0	0	0	0.3	0	0	0	0
6	Quinoa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	Ginger	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	Black pepper	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Gewogs Þ		Sangngagcholing		Tading		Tendruk		Gakidling		Shompangkha		Dekiling		Samtenling		Tareythang	
Serial No.	**Crops**	**A**	**B**	**A**	**B**	**A**	**B**	**A**	**B**	**A**	**B**	**A**	**B**	**A**	**B**	**A**	**B**
1	Paddy	700	0	20	18.5	200	0	155	0	70	50	180	0	185	0	66	0
2	Potato	0	0	2	5	0	0	0	0	0	10	0	4	2.5	2.5	25	0
3	Vegetables	5	0.7	10	15	0	0	15	0	0	20	6.45	16	2	10	3	15
4	Large Cardamom	0	0	150	50	0	0	0	0	0	7	0	16	0	5	0	0
5	Citrus	0	0	80	20	0	0	100	0	0	15	0	6	0	0	0	2
6	Quinoa	0	0	4	0	0	0	0	0	0	0.5	0	0	0	0	0	0
7	Ginger	0	0	100	0	0	0	6	0	0	15	0	0	0	0	0	71
8	Black pepper	0	0	0.4	0	0	0	0	0	0	2	0	0	0	0	0	0

A* = Assured Area under Flood Irrigation

B = Assured Area under Micro-Irrigation**

Source: Source: FSAPP Gewog Agriculture Extension Officers

Annex 5: Tables of Analysis Pertaining to Nutritional Analysis

Table 1: Percentage of households with food groups consumed by the Gewogs and the Dzongkhags

Dzongkhag/ Gewog	Food Groups											
	Cereals	White roots and tubers	Vegetables	Fruits	Meat	Eggs	Fish and Sea foods	Legumes, nuts and seeds	Milk and milk products	Oils and fats	Sweets	Spices, condiments and beverages
Chhukha	**100.0**	**41.1**	**98.5**	**60.4**	**40.2**	**22.4**	**8.7**	**50.1**	**80.7**	**94.8**	**78.9**	**99.4**
Bongo	100.0	38.0	99.2	71.1	39.7	24.0	10.7	48.8	83.5	99.2	88.4	99.2
Dungna	100.0	18.8	94.9	63.8	53.6	28.3	8.7	50.7	90.6	100.0	87.7	99.3
Getana	100.0	27.0	100.0	63.5	42.9	25.4	3.2	49.2	85.7	100.0	90.5	100.0
Metakha	100.0	22.4	98.5	55.2	34.3	19.4	1.5	37.3	85.1	97.0	83.6	100.0
Sampheling	100.0	73.3	98.3	38.3	35.0	15.8	10.0	58.3	65.8	80.0	48.3	99.2
Dagana	**99.7**	**53.8**	**94.0**	**51.0**	**46.9**	**36.7**	**15.8**	**46.1**	**79.4**	**77.9**	**63.2**	**91.8**
Drujeygang	100.0	44.3	95.0	58.6	35.0	50.0	19.3	39.3	85.0	75.7	61.4	95.7
Kana	99.2	53.8	88.2	46.2	63.9	38.7	10.9	36.1	81.5	69.8	52.9	78.2
Lhamoizingkha	100.0	75.2	91.5	52.1	65.8	32.5	24.8	50.4	81.2	87.2	72.7	88.9
Nichula	100.0	62.7	100.0	50.9	30.5	13.6	5.1	62.7	69.5	81.4	76.3	98.3
karmaling	99.0	48.5	99.0	38.1	39.2	17.5	8.3	62.9	66.0	81.4	63.9	100.0
Haa	**97.5**	**38.7**	**97.7**	**54.8**	**39.7**	**36.5**	**5.6**	**29.4**	**87.0**	**98.2**	**62.6**	**99.4**
Gakiling	91.4	31.0	98.3	36.2	25.9	31.0	17.2	36.2	77.6	98.3	34.5	98.3
Samar	95.9	45.9	96.9	73.5	42.9	33.7	5.1	36.7	96.9	100.0	72.5	99.0
Sangbaykha	100.0	29.9	98.5	26.9	38.8	34.3	0.0	19.4	82.1	95.5	61.2	100.0
Uesu	100.0	49.0	96.9	87.8	48.0	45.9	5.1	30.6	90.8	100.0	75.5	100.0
Samtse	**98.8**	**57.5**	**98.6**	**42.2**	**27.2**	**18.9**	**9.3**	**54.7**	**63.8**	**94.7**	**43.6**	**98.4**
Dophuchen	100.0	37.9	99.2	49.2	16.7	18.2	9.1	47.0	62.1	96.2	43.9	99.2
Norbugang	92.1	78.4	97.7	51.1	42.1	21.6	12.5	46.6	69.3	94.3	44.3	96.6
Sangngagcholing	100.0	79.8	100.0	45.6	36.0	28.1	12.3	65.8	64.9	98.3	45.6	99.1
Tading	100.0	60.4	97.3	29.5	25.5	19.5	10.7	59.7	61.1	95.3	46.3	99.3
Tendruk	100.0	43.2	99.3	42.5	24.5	8.6	1.4	56.1	64.8	88.5	36.0	96.4
Sarpang	**98.7**	**66.7**	**95.5**	**61.3**	**31.6**	**33.6**	**19.1**	**58.2**	**89.5**	**91.8**	**78.8**	**96.1**
Dekiling	99.3	70.6	95.8	60.8	37.1	41.3	26.6	55.9	89.5	92.3	72.7	96.5
Gakidling	100.0	53.3	95.7	57.6	25.0	25.0	9.8	63.0	93.5	94.6	80.4	97.8
Samtenling	96.9	72.2	95.9	67.0	34.0	35.1	13.4	59.8	84.5	86.6	81.4	93.8
Shompangkha	97.0	67.3	95.1	67.3	29.7	27.7	26.7	62.4	84.2	90.1	83.2	96.0
Tareythang	100.0	86.5	94.2	50.0	34.6	46.2	25.0	36.5	98.1	96.2	78.9	94.2

Note: The vegetable food group is a combination of vitamin A rich vegetables and tubers, dark green leafy vegetables and other vegetables. The fruit group is a combination of vitamin A rich fruits and other fruits. The meat group is a combination of organ meat and flesh meat.

Source: FSAPP Baseline Household Survey, Oct – Nov, 2018, Bhutan Consulting Associates

Table 2: Household Dietary Diversity Scores by the Gewogs and the Dzongkhags

Dzongkhag/Gewog	Household Dietary Diversity Score (HDDS)											Total
	2	3	4	5	6	7	8	9	10	11	12	
	Percentage of Households											
Chhukha	**0.0**	**0.2**	**1.6**	**5.4**	**12.2**	**25.4**	**25.9**	**16.1**	**9.0**	**3.2**	**1.2**	**100.0**
Bongo	0.0	0.0	0.0	2.5	9.1	30.6	24.8	15.7	11.6	4.1	1.7	100.0
Dungna	0.0	0.0	0.7	2.2	11.6	19.6	34.8	18.1	9.4	2.9	0.7	100.0
Getana	0.0	0.0	0.0	4.8	11.1	25.4	25.4	20.6	11.1	0.0	1.6	100.0
Metakha	0.0	0.0	1.5	7.5	11.9	31.3	31.3	14.9	1.5	0.0	0.0	100.0
Sampheling	0.0	0.8	5.8	12.5	19.2	15.8	20.8	14.2	5.8	4.2	0.8	100.0
Dagana	**0.3**	**2.3**	**5.3**	**6.6**	**14.3**	**17.5**	**22.9**	**15.1**	**8.1**	**5.0**	**2.6**	**100.0**
Drujeygang	0.7	2.1	4.3	5.0	14.3	17.9	24.3	15.7	11.4	2.9	1.4	100.0
Kana	0.0	3.4	10.1	10.1	16.0	15.1	17.7	11.8	9.2	3.4	3.4	100.0
Lhamoizingkha	0.0	0.9	0.9	5.1	12.0	15.4	26.5	18.0	4.3	10.3	6.8	100.0
Nichula	0.0	5.1	6.8	5.1	5.1	20.3	27.1	18.6	5.1	6.8	0.0	100.0
karmaling	0.0	2.1	6.2	8.3	18.6	20.6	20.6	13.4	4.1	5.2	1.0	100.0
Haa	**0.0**	**0.0**	**1.4**	**9.6**	**14.6**	**26.9**	**23.4**	**13.6**	**7.6**	**2.6**	**0.3**	**100.0**
Gakiling	0.0	0.0	5.2	24.1	12.1	31.0	10.3	12.1	3.5	1.7	0.0	100.0
Samar	0.0	0.0	0.0	2.0	12.2	22.5	28.6	20.4	11.2	3.1	0.0	100.0
Sangbaykha	0.0	0.0	1.5	11.9	22.4	32.8	26.9	3.0	1.5	0.0	0.0	100.0
Uesu	0.0	0.0	0.0	3.1	8.2	20.4	23.5	22.5	15.3	6.1	1.0	100.0
Samtse	**0.0**	**0.8**	**5.2**	**11.5**	**19.9**	**23.8**	**18.2**	**13.9**	**4.9**	**0.9**	**1.1**	**100.0**
Dophuchen	0.0	1.5	4.6	15.9	22.0	25.8	13.6	12.9	3.0	0.0	0.8	100.0
Norbugang	0.0	1.1	9.1	2.3	14.8	22.7	17.1	21.6	9.1	1.1	1.1	100.0
Sangngagcholing	0.0	0.0	1.8	7.9	13.2	24.6	21.1	16.7	7.9	3.5	3.5	100.0
Tading	0.0	0.0	2.7	14.8	19.5	23.5	23.5	12.1	2.7	0.7	0.7	100.0
Tendruk	0.0	1.4	10.1	10.8	28.1	21.6	14.4	8.6	5.0	0.0	0.0	100.0
Sarpang	**0.0**	**0.7**	**1.2**	**3.5**	**10.0**	**19.5**	**23.3**	**19.2**	**11.6**	**7.6**	**3.5**	**100.0**
Dekiling	0.0	0.7	1.4	4.9	8.4	17.5	23.1	13.3	14.0	11.9	4.9	100.0
Gakidling	0.0	1.1	0.0	3.3	8.7	25.0	28.3	19.6	10.9	1.1	2.2	100.0
Samtenling	0.0	1.0	3.1	2.1	11.3	16.5	17.5	25.8	12.4	8.3	2.1	100.0
Shompangkha	0.0	0.0	1.0	5.0	9.9	17.8	22.8	22.8	6.9	8.9	5.0	100.0
Tareythang	0.0	0.0	0.0	0.0	17.3	17.3	21.2	15.4	13.5	11.5	3.9	100.0

Source: FSAPP Baseline Household Survey, Oct – Nov, 2018, Bhutan Consulting Associates

Table 3: Food Consumption Pattern of Boarding Students (%) by Consumed Food Groups, and by Schools

Food Groups	Name of the Schools										Total
	Bongo Primary School	Dorokha Central School	Drujeygang Central School	Dungna Lower Secondary School	Gyenkhana Primary School	Lhamoi/kha Central School	Pakshikha Central School	Rangtse Primary School	Sengdhyen Lower Secondary School	Tendruk Central School	
Cereals	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Tubers	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Vitamin A rich vegetables	0.0	100.0	100.0	100.0	0.0	0.0	100.0	100.0	100.0	0.0	60.0
Leafy vegetables	100.0	100.0	100.0	100.0	0.0	100.0	100.0	100.0	0.0	100.0	80.0
Other vegetables	100.0	100.0	100.0	0.0	100.0	100.0	100.0	100.0	100.0	100.0	90.0
Vitamin A rich fruit	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other fruits	0.0	100.0	100.0	0.0	0.0	100.0	0.0	0.0	0.0	100.0	40.0
Organ meats	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Meat	0.0	0.0	100.0	0.0	0.0	100.0	0.0	100.0	0.0	100.0	40.0
Eggs	100.0	100.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	30.0
Fish and sea foods	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Legume	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Milk and milk products	100.0	100.0	100.0	0.0	100.0	100.0	100.0	100.0	0.0	0.0	70.0
Oils	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: FSAPP Baseline School Survey, Oct – Nov, 2018, Bhutan Consulting Associates

Table 4: Food Consumption Pattern of the Day scholars (%) by Number Consumed Foods, and by Dzongkhag /Gewogs

Dzongkhag/Gewog	Individual Dietary Diversity Score (IDDS)										
	3	4	5	6	7	8	9	10	11	12	13
	Percentage of Households										
Chhukha	**0.0**	**2.9**	**8.4**	**17.1**	**30.1**	**24.3**	**8.6**	**5.8**	**2.9**	0.0	0.0
Bongo	0.0	0.0	11.8	16.0	26.1	26.0	8.1	8.1	4.0	0.0	0.0
Dungna	0.0	10.0	0.0	20.0	40.0	20.0	10.0	0.0	0.0	0.0	0.0
Dagana	0.0	**0.0**	**3.0**	**5.0**	**20.9**	**25.0**	**18.0**	**17.1**	**5.0**	**3.9**	**2.0**
Drujeygang	0.0	0.0	2.5	5.0	22.5	25.0	17.5	15.0	5.0	5.0	2.5
Lhamoizingkha	0.0	0.0	3.3	5.0	20.0	25.0	18.3	18.3	5.0	3.3	1.7
Haa	0.0	10.0	10.0	30.0	10.0	40.0	0.0	0.0	0.0	0.0	0.0
Gakiling	0.0	0.0	0.0	30.0	20.0	10.0	30.0	10.0	0.0	0.0	0.0
Samar	0.0	4.0	4.0	30.0	16.0	22.0	18.0	6.0	0.0	0.0	0.0
Samtse	**0.4**	**3.0**	**4.3**	**16.0**	**19.1**	**22.8**	**18.3**	**10.1**	**4.5**	**0.0**	**0.0**
Dophuchen	0.0	4.2	1.1	20.9	16.7	20.5	13.5	11.4	8.0	0.0	0.0
Tendruk	0.7	2.1	6.4	12.9	20.7	24.3	21.4	9.3	2.1	0.0	0.0

Source: FSAPP Baseline School Survey, Oct – Nov, 2018, Bhutan Consulting Associates

Table 5: Food Consumption Pattern of the Day scholars (%) by Consumed Food Groups, and by Dzongkhag/Gewog

Dzongkhag/ Gewog	Food Groups													
	Cereals	Tubers	Vitamin A	Leafy vegetables	Other Vegetables	Vitamin A rich fruits	Other Fruits	Organs	Meat	Eggs	Fish	Legumes, nuts and seeds	Milk	Oils
Chhukha	**100.0**	**72.8**	**38.5**	**77.4**	**76.1**	**14.4**	**52.9**	**2.9**	**15.8**	**25.9**	**11.5**	**62.6**	**78.5**	**98.6**
Bongo	100.0	65.8	37.9	80.4	78.6	20.2	54.0	4.0	22.1	32.3	16.1	47.5	86.0	98.1
Dungna	100.0	90.0	40.0	70.0	70.0	0.0	50.0	0.0	0.0	10.0	0.0	100.0	60.0	100.0
Dagana	**94.3**	**92.1**	**53.3**	**67.0**	**94.1**	**40.7**	**68.8**	**21.8**	**49.1**	**31.1**	**13.9**	**54.3**	**80.7**	**91.8**
Drujeygang	90.0	90.0	65.0	82.5	92.5	30.0	72.5	10.0	32.5	45.0	15.0	50.0	85.0	95.0
Lhamoizingkha	96.7	93.3	46.7	58.3	95.0	46.7	66.7	28.3	58.3	23.3	13.3	56.7	78.3	90.0
Haa	**96.0**	**64.0**	**50.0**	**62.0**	**84.0**	**16.0**	**48.0**	**22.0**	**48.0**	**18.0**	**6.0**	**48.0**	**64.0**	**100.0**
Gakiling	90.0	100.0	80.0	50.0	60.0	10.0	0.0	10.0	60.0	0.0	0.0	60.0	40.0	100.0
Samar	100.0	40.0	30.0	70.0	100.0	20.0	80.0	30.0	40.0	30.0	10.0	40.0	80.0	100.0
Samtse	**100.0**	**86.5**	**44.5**	**64.7**	**93.9**	**21.9**	**74.9**	**1.7**	**25.3**	**24.0**	**11.4**	**65.6**	**66.7**	**99.2**
Dophuchen	100.0	82.1	53.7	67.6	91.1	28.0	75.7	4.2	30.2	25.7	9.3	61.0	70.5	98.9
Tendruk	100.0	89.3	38.6	62.9	95.7	17.9	74.3	0.0	22.1	22.9	12.9	68.6	64.3	99.3

Source: FSAPP Baseline School Survey, Oct – Nov, 2018, Bhutan Consulting Associates

Annex 6: List of Focus Group Discussion (FGDs) Conducted

FGD No		Gewog	No. of Males	No. of Females
1	23-10-18	Norbugang	13	2
2	24-10-18	Norbugang	10	15
3	25-10-18	Trendruk	11	10
4	25-10-18	Miglamthang, Tendruk	16	10
5	26-10-18	Kuchin, Tendruk	14	16
6	26-10-18	Dawathang, Tendruk	12	13
7	28-1018	Nidupling, Sanangcholing	14	10
8	29-10-18	Sanangcholing	15	15
9	31-10-18	Gangteykha, Arekha, mejongnsa, Dokap (Dophugchen Gewog)	22	15
10	01-11-18	Singye, Dophugchen	18	15
11	03-11-18	Tading	22	15
12	04-11-18	Tetering, Tading	7	3
13	06-11-18	Pekarling, Sampheling	13	4
14	06-11-18	Khatey, samphelling	15	10
15	07-11-18	Pedtshelnang, Samphelling	15	15
16	23-10-18	Kana (Nindokha/Kanakha Chiwog)	9	8
17	25-10-18	Kana (Bjurugang/Luntengang/Kashithnag Chiwog)	8	7
18	26-10-18	Drujeygang (Upper and Lower Thangna)	11	12
19	27-1018	Drujeygang (Upper & Lower Pangserpo Chiwog)	10	11
20	30-1018	Taraythang (Pemacholing /Yezergang Chiwog)	8	12
21	01-11-18	Samtenling (Dechen Pelri/Chokorling Chiwog)	8	7
22	02-11-18	Dekiling (Gawaithang Chiwog)	9	8
23	03-11-18	Shompangkha (Dargaythang Chiwog)	7	8
24	04-11-18	Shompangkha (Gomchula Chiwog)	8	8
25	05-11-18	Shompangkha (Rigsumgang Chiwog)	6	9
26	06-11-18	Gakiding (Gaytemkha/Gakiding/Relangthang Chiwog)	10	12
27	06-11-18	Gakiding (Muga Chiwog)	8	7
28	10-11-18	Lhamozingkha, Magigoan (Kuendrelthang) Chiwog	6	7
29	11-11-18	Lhamozingkha (Devitar Chiwog)	8	8
30	12-11-18	Nichula (Alley/Khatarey Chiwog)	7	6
31	13-11-18	Karmaling (Jemathang Chiwog)	7	5
32	14-11-18	Karmaling (Omchu Chiwog)	0	8
33	23-10-18	Gakiling	15	15
34	24-10-18	Gakiling	15	15
35	25-10-18	Sangbaykha	15	15
36	28-10-18	Uesu	10	15
37	30-1018	Samar	15	10
38	02-11-18	Bongo	10	10
39	06-11-18	Gatana	10	10
40	09-11-18	Metakha	10	10
41	10-11-18	Dungna	10	10
		Total	457	421
		Total Farmers	878	

Annex 7: List of Officials Met

Sl No.	Name	Designamtion	Gender	Gewog	Dzongkhag
1	Choki Wangdi	Agriculture Extension Officer	Male	Kana	Dagana
2	Sangay	Mangmi	Male	Kana	Dagana
3	Gembo	Tshogpa (Lhaling)	Male	Kana	Dagana
4	Krishna Bdr. Subbha	Tshogpa (Pungzhi)	Male	Kana	Dagana
5	Jit Bdr. Powrel	Tshogpa (Dalithang)	Male	Kana	Dagana
6	Sangay Gyeltshen	Tshogpa (Bjurugang)	Male	Kana	Dagana
7	Karma Tshering	Gup	Male	Drujeygang	Dagana
8	Lhakpa Dorji	Gewog Administrative Officer	Male	Drujeygang	Dagana
9	Jamtsho	Tshogpa (Upper Pangna)	Male	Drujeygang	Dagana
10	Sonam Khandu	Tshogpa (Lower Pangna)	Male	Drujeygang	Dagana
11	Namgaymo	Tshogpa (Upper Pangserpo)	Female	Drujeygang	Dagana
12	Lhakpa	Tshogpa (Lower Pangserpo)	Male	Drujeygang	Dagana
13	Ugyen Lhendup	Tshogpa (Thangna)	Male	Drujeygang	Dagana
14	Sonam Wangdi	Agriculture Extension Officer	Male	Lhamozingkha	Dagana
15	Barun Majhi	Tshogpa (Magigoan)	Male	Lhamozingkha	Dagana
16	Krina Prashad Subbha	Tshogpa (Devitar)	Male	Lhamozingkha	Dagana
17	Rohit Koirala	Tshogpa (Sibsooni)	Male	Lhamozingkha	Dagana
18	Sonam	Tshogpa (Daragaon)	Male	Lhamozingkha	Dagana
19	Dawa Tshering	Agriculture Extension Officer	Male	Nichula	Dagana
20	Dilip Kumar Gurung	Gup	Male	Nichula	Dagana
21	Padam Bdr. Powdrel	Mangmi	Male	Nichula	Dagana
22	Kharka Bdr. Chettri	Tshogpa (Daragoan)	Male	Nichula	Dagana
23	Kumar Kharkay	Tshogpa (Bichgoan)	Male	Nichula	Dagana
24	Om Nath Bhattarai	Tshogpa (Alley)	Male	Nichula	Dagana
25	Ratna Bdr. Powdrel	Tshogpa (Kataray)	Male	Nichula	Dagana
26	Sangay Dorji	Agriculture Extension Officer	Male	Karmaling	Dagana
27	Rinchen Wangdi	Gewog Administrative Officer	Male	Karmaling	Dagana
28	Dew Kumar Tamang	Tshogpa (Omchu)	Male	Karmaling	Dagana
29	Passang Sherpa	Tshogpa (Jamethang)	Male	Karmaling	Dagana
30	Tika Ram Subbha	Tshogpa (Sumechumthang)	Male	Karmaling	Dagana
31	Dawa Namgay Sherpa	Tshogpa (Karmaling)	Male	Karmaling	Dagana
32	Dil Kumar Gurung	Tsgogpa (Laptshakha)	Male	Karmaling	Dagana
33	Narin Neopany	Gup	Male	Tareythang	Sarpang
34	Dan Man Gurung	Mangmi	Male	Tareythang	Sarpang
35	Yeshey Dhendup	Tshogpa (Pemacholing)	Female	Tareythang	Sarpang
36	Tshering Tenzom	Tshogpa (Yezergang)	Female	Tareythang	Sarpang
37	Pema Chezom	Tshogpa (Tashicholing)	Female	Tareythang	Sarpang
38	Ugyen Gyeltshen	Agriculture Extension Officer	Male	Tareythang	Sarpang
39	Jambay Lhamo	Agriculture Extension Officer	Female	Samtenling	Sarpang
40	B.K Baraili	Mangmi	Male	Samtenling	Sarpang
41	Deo Kumar	Tshogpa (Khempagang)	Male	Samtenling	Sarpang
42	Lalit Ghalley	Tshogpa (Samtenling)	Male	Samtenling	Sarpang
43	Karma Tenzin	Tshogpa (Dechen Pelri)	Male	Samtenling	Sarpang
44	Tshewang Peldon	Tshogpa (Samtenthang)	Female	Samtenling	Sarpang
45	Sarita	Agriculture Extension Officer	Female	Dekiling	Sarpang
46	Devi Bhakta Ghalley	Mangmi	Male	Dekiling	Sarpang
47	Jagath Bdr. Rai	Tshogpa (Gawaithang)	Male	Dekiling	Sarpang
48	Norbu Wangdi	Tshogpa (Jemeling)	Male	Dekiling	Sarpang
49	Padmalal Khatiware	Chupon (Chokhorling)	Male	Dekiling	Sarpang
50	Madhu Devi Baniya	Agriculture Extension Officer	Female	Shompangkha	Sarpang
51	Kiran Rai	Tshogpa (Rigsumgang)	Male	Shompangkha	Sarpang

Sl No.	Name	Designamtion	Gender	Gewog	Dzongkhag
52	Mek Dorji Tamang	Tshogpa (Kencholing)	Male	Shompangkha	Sarpang
53	Chandra Bdr. Rai	Tshogpa (Gomchula)	Male	Shompangkha	Sarpang
54	Tashi Tshomo	Agriculture Extension Officer	Female	Gakidling	Sarpang
55	Ram Bdr. Pithakotey	Mangmi	Male	Gakiding	Sarpang
56	Ram Bhakta Rai	Tshogpa (Gaytemkha)	Male	Gakiding	Sarpang
57	Bhim Bdr. Raika	Tshogpa (Relangthang)	Male	Gakiding	Sarpang
58	Damber Bdr. Pulami	Tshogpa (Gakiding)	Male	Gakiding	Sarpang
59	Bhakta Bdr. Khapangi	Tshogpa (Muga)	Male	Gakiding	Sarpang
60	Yeshey Choden	Tshogpa (Baikungza)	Female	Bongo	Chhukha
61	Gashay	Gup	Male	Gakiling	Haa
62	Khandu Wangchuk	Principal	Male	Gakiling	Haa
63	Kinley Wangchuk	ES II (Agriculture ext.)	Male	Gakiling	Haa
64	Sonam Wangchuk	ex. Mangmei	Male	Gakiling	Haa
65	Thinley	Clerk	Male	Sangbaykha	Haa
66	Karma Dorji	Gewog Adm. Officer.	Male	Sangbaykha	Haa
67	Ugyen Penjor	Tshogpa	Male	Sangbaykha	Haa
68	Tashi	Mangmi	Male	Sangbaykha	Haa
69	D.K Sharma	Agriculture Extension Officer	Male	Eusu	Haa
70	Sonam Tshering	Tshogpa	Male	Eusu	Haa
71	Lhab Dorji	Tshogpa	Male	Eusu	Haa
72	Phub Gyeltshen	Tshogpa	Male	Eusu	Haa
73	Tshewang Dema	Tshogpa	Female	Eusu	Haa
74	Gem Lhamo	Agriculture Extension Officer	Male	Samphelling	Chhukha
75	Tshewang Thinley	Agriculture Extension Officer	Male	Bongo	Chhukha
76	Rinchen Gyeltshen	Tshogpa	Male	Bongo	Chhukha
77	Sangay Lham	Tshogpa	Female	Bongo	Chhukha
78	Tandin	Tshogpa	Male	Bongo	Chhukha
79	Dawa Pelzang	Tshogpa	Male	Bongo	Chhukha
80	Kencho	Tshogpa	Male	Bongo	Chhukha
81	Kinley	Gup	Male	Getena	Chhukha
82	Dorji	Tshogpa	Male	Getena	Chhukha
83	Lhab Tshering	Tshogpa	Male	Getena	Chhukha
84	Passang Tshering	Gup	Male	Metakha	Chhukha
85	Tashi Choki	Tshogpa	Male	Metakha	Chhukha
86	Thinley Gyelsthen	Agriculture Extension Officer	Male	Metakha	Chhukha
87	Passang	Gup	Male	Dungna	Chhukha
88	Yeshi	Tshogpa	Male	Dungna	Chhukha
89	Chencho Dorji	Tshogpa	Male	Dungna	Chhukha
90	Birtan Rai	Mangmi	Male	Dungna	Chhukha
91	Damber Singh Mongar	Agriculture Extension Officer	Male	Dungna	Chhukha
92	Tendu	Agriculture Extension Officer	Male	Norbugang	Samtse
93	Kinga Wangdi	Gup	Male	Norbugang	Samtse
94	Kesang Wangmo	Agriculture Extension Officer	Female	Tendruk	Samtse
95	Tshering Lhamo	Agriculture Extension Officer	Female	Sang/choling	Samtse
96	Gem Tshering	Agriculture Extension Officer	Male	Dophugchen	Samtse
97	Ganesh Sherpa	Agriculture Extension Officer	Male	Tading	Samtse

Annex 8: Description of the Secondary Data Sources

Bhutan Multiple Indicator Survey (BMIS)

National statistics bureau conducted the BMIS in 2010, in collaboration with the UNICEF and UNFPA. Data were collected during the month of March, 2010. It is conducted every 10 years. It was first conducted in 2010, and scheduled for second round of BMIS in 2020. The unit of observation is both at individual and household level.It is representative at national, Regional, Dzognkhag (sub-district), and area (urban and rural) level.

From household, data collected are for: Household listing, Education, Water and sanitation, Household characteristics, Child labour, Disability and Handwashing. For Individual (Women 15-49 years), data are collected for: Women's background, Child mortality, Desire for last birth, Maternal and newborn health, Contraception, Unmet needs, Married/union, Attitude towards and experience of domestic violence, HIV/AIDS, and Maternal mortality. For individual (children under age of five) data are collected for: Age, Birth registration, Early childhood development. Breastfeeding, Care of illness and Anthropometry

National Health Survey (NHS)

The Ministry of Health (MoH) has conducted four National Health Surveys - in 1984, 1994, 2000, and 2012. The unit of observation is at household level. It is nationally representative, including at Dzongkhag and area level. The individual questionnaire collected information from persons aged 10-75 years on theirpersonal knowledge and behavior relating to a wide range of health related topics including non-communicable disease risk factors and perception about quality of health care. The women's module collected data related to reproductive and maternal health from females aged 10-49 years.
The violence against women questionnaire collected information on attitude towards intimate partner violence and on the prevalence of both intimate partner and/or non-partner violence. The immunization questionnaire collected data to determine the coverage of childhood immunization, human papilloma virus vaccine, and maternal tetanus toxoid vaccination.

National Nutrition Survey (NNS)

Ministry of Health conducts NNS. It was conducted in 2015. The unit of observation is at household and individual level. It is nationally representative, including at Dzongkhag and area level. **The Household Module** consists of questions pertaining to household demographic information, household socio-economic status, water supply sanitation and hygiene, household food security and household dietary diversity. **The Women and Child Module** consists of questions pertaining to both the knowledge and practice of child feeding. **The Pregnant Women Module** consists of questions pertaining to the dietary intake information of pregnant women. **The Anthropometry Module** consists of taking height/length and weight measurements, edema assessment and hemoglobin readings from eligible women and children from selected households. Anthropometry was conducted on all children below five years of age in the household, while hemoglobin tests were conducted on all women aged 10-49 years and all children between 6-59 months of age.

Annual Education Statistics

Published annually by the policy and planning division, Ministry of Education. The annual education sta editin was in 1988. Data for the Annual Education Statistics are collected through a web-based Management Information System (EMIS). The Dzongkhags/thromdes and schools have been given di and rights to view and update their data. Students and teachers data at all levels of schools are col analyses are presented at national and school levels with students' population. The quality and indicators are also reported. Data on tertiary education, non-formal, continuing education, technical monastic education, UG scholarships and privately funded students, private colleges/training institu feeding programme, ECCD, special institutes, in-service teacher training, financial information are als from other agencies.

Agriculture Statistics

Agriculture statistics are reported annually, published by the Department of Agriculture, Ministry of Agriculture and Forests. With data collection designed by the statistician in the Ministry, the data are collected by respective Gewog agriculture officers and analysed and reported by the statistician in the department. The annually published statistics is at National and Dzongkhags levels. It provides data on farming population (households), land holdings, land use, crop area, yield, production, utilization of crops and other general aspects in farming.

Annex 9: Terms of Reference

1. Background.

The Food Security and Agriculture Productivity Project (FSAPP) is funded by Global Agriculture and Food Security Program (GAFSP) and supervised by the World Bank. It covers five South-Western Dzongkhags Viz.Sarpang, Samtse, Dagana, Chhukha and Haa. Out of 58 Gewogs in these 5 Dzongkhags, the project has selected 24 Gewogs as project area. The project is being implemented by the Department of Agriculture, Ministry of Agriculture and Forests.

The project supports Government's efforts to reduce rural poverty, food insecurity and malnutrition. It also aims to increase resilience to climate change through climate smart agriculture (CSA) practices for enhancing food security and nutrition and increased access to local and export markets for producers. The project focuses on:

(i) The farmer as the primary beneficiary and lead actor in food security, nutrition and agricultural commercialization.
(ii) On increasing the productivity of food crops (rice, potato and quinoa) and high value crops (large cardamom, ginger, spices, vegetables and citrus).
(iii) Linking farmers to agri-markets through a value chain approach.

The achievement of the Project Development Objective (PDO) will be measured by 3 indicators:

(i) An increase in the productivity of targeted crops (Rice, Potato, Quinoa, Citrus, Vegetables[12], Large cardamom, Spices[13])by at least 20 percent in project areas,
(ii) An increase in both the volume and value of produce marketed by at least 20 percent, and
(iii) The number of direct project beneficiaries, of whom approximately 30 percent will be women.
(iv)

2. Objective:

The objective of the baseline study is to establish benchmarks of project results framework and various components including on environment and social safeguards and on gender issues prior to the actual implementation of the activities, which will be used as the basis for comparison and monitoring of the project activities.

3. Scope

This study will cover 24 gewogs in five South-Western Dzongkhags: Sarpang, Samtse, Dagana, Chhukha, and Haa and 17 identified Schools. The consultant is expected to conduct a detail study on the current status of the results framework and four components as given below:

1. Strengthening Farmer and Producer Groups,
2. Enhancing Farmer Productivity, and
3. Enhancing Access to Markets
4. Project Management

[12]Chilli, Cauliflower, Beans, Tomato, Onion, Broccoli, Carrot, Cabbage, Pea, Green leafy vegetables
[13] Ginger & Black Pepper

A total number of 8,023 households are considered for this study, however due to time and resource constraints, the Project Management Unit decided to opt for sampling method considering at least 30% of the total households and 10 schools to ensure fair representation of the larger group.

4. Key Deliverables

In order to deliver as expected, the consultant is required to travel to 5 South-Western DzongkhagsViz.Sarpang, Samtse, Dagana, Chhukha and Haa and 24 Gewogs under these Dzongkhags. The consultant is expected to study the status of Results Framework and four components as reflected below. A total number of 8,023 households are considered for this study, however due to time and resource constraints, the consultant will have to collect data from at least 30% of the total households(30% of 8023 HHs work out to 2407 households) to fairly represent the mass.

The specific lists of deliverables areas given below:

4.1. Project Development Objective (PDO): The PDO is to increase agricultural productivity and enhance access to markets for farmers in selected gewogs of south-west Bhutan. The Consultant is expected to determine the baseline for the following indicators:

4.1.1. Productivity of targeted crops[14]in project areas.
4.1.2. Volume of produce marketed for the targeted crops in project areas.
4.1.3. Value of produce marketed for the targeted crops in project areas.
4.1.4. Number of direct project women and men beneficiaries.
4.1.5. Household income per annum, segregated by head of household[15].
4.1.6. Household food security status (food shortages and surpluses) segregated by head of household.
4.1.7. Nutrition status of the beneficiaries (stunting, malnutrition) with gender and poverty dimension. (Literature/desk review only).

4.2. Component 1: Strengthening Farmers and Producer Groups

4.2.1. Number of existing farmer groups and memberships disaggregated by gender
4.2.2. Number of farmer groups receiving technical trainings and other capacity building support.
4.2.3. Number of farmers who are members of an association including producer groups, cooperatives etc (disaggregated by gender) and its functionality.
4.2.4. Number of people and school children receiving improved nutrition services and products.
4.2.4.1. Number of people who received nutrition counseling/education, recipients of Ready-to-use-Therapeutic Foods, Vitamin A and micronutrient supplements.
4.2.4.2. Number of people receiving extension support for nutrition-relevant techniques. (Questionnaire to include knowledge on Nutrition to cover food diversification and dietary habits, nutrition awareness and behavior, food safety).

4.3. Component 2: Enhancing Farmer Productivity

4.3.1. Targeted crop (acres) area provided with assured irrigation (targeted crops are rice, vegetables, Potatoes, Large Cardamom and Citrus).
- Area covered by the assured (flood) Irrigation in acres.
- Area covered by Micro irrigation in acres.

4.3.2. Number of water users with existing and new groups segregated by gender of the composition of the water user's groups.
4.3.3. Number of farmers who have adopted an improved agricultural technology
4.3.4. Total land area under cultivation for citrus and cardamom in acres.

4.4.Component 3: Enhancing Access to Markets

[14] Rice, Vegetables, Potatoes, Large Cardamom, Citrus, Quinoa and spices (Ginger & Black pepper)

[15]The main decision maker (related to agriculture and household affairs) and the main income earner of the household

4.4.1. Number of Agri-cooperatives and informal farmer groups with access to market infrastructure facilities segregated by gender of the chairperson of the group accessing marketing infrastructure facilities.
4.4.2. Number of producer groups receiving market information segregated by gender of the chairperson of the group.
4.4.3. Number of farmer groups linked to school feeding program segregated by gender of the chairperson of the group.
4.4.4. Number of school children receiving the recommended 5 servings of fruits/Vegetables per day segregated by gender.

4.5.Component 4: Project Management

4.5.1. Number of learning notes & case studies published and disseminated.
4.5.2. Percentage of beneficiaries satisfied with services provided by project segregated by gender and by Gewog/District.
4.5.3. Number of progress reports prepared and disseminated.
4.5.4. Number of project staff received capacity building training.
4.5.5. Number and type of capacity building training/exposure visits provided to the staff.

4.6.The consultant is expected to collect the following cross cutting data on:

4.6.1. Gender disaggregated data on group members including on the office bearers, any member from single female headed household[16]., any member with disabilities, etc.
4.6.2. Challenges faced by Female farmers in production, transportation and marketing of farm products
4.6.3. Specific crops that women are interested to grow or that they see the need for it or the market.
4.6.4. Any other challenges women farmers face.

5. Schedule for completion of study

Sl. No.	Mile stone	Activities	Timeline
1	Inception Report	• Methodology • Detailed Work plan (Gantt Chart or other relevant Charts) • Report structure with clear deliverable in every milestone. • Developed& finalizedQuestionnaires • Inception report presented	1st week of 1st month
2	Interim progress Report	• Enumerators recruited and trained • Enumerators deployed in the field and responsibilities distributed. • Data collection initiated and under progress • Interim progress report submitted	End of 1st month
3	Final Draft Report	• Data collected • Compiled, refined and analyzed the data • Submit Final Draft report and	3rdweek of 2nd month

[5] "Households where either no adult males are present, owing to divorce, separation, migration, non-marriage or widowhood, or where men, although present, do not contribute to the household income." (ILO)

		• Present the report to the committee	
4	Final report	• Final report submission after incorporation of the comments	4th week of 2nd month

6. Procedure for review of progress reports, payment method and to enhance gender equality and social inclusion in the conduct of the survey

A mile stone report submitted by the consultant will be reviewed by the panel consisting of experts from various fields as scheduled. If the report is not satisfactory, the consultant will be provided with the recommendations to be incorporated. The report will be re-reviewed and only upon fully satisfying the panel the report will be certified for mile stone payment.

The Consultant will ensure that the language used in the development of the survey materials (including report) and field team is gender sensitive and socially inclusive.

7. Facilities to be provided by the procuring agency (PMU, FSAPP)

The consultant will be provided with 24 Gewogs House hold list by the RNR Statistical Division of MoAF while the Dept. of Agriculture Annual Agriculture Survey can be accessed at http://www.moaf.gov.bt/download/Statisitcs/Department-of-Agriculture/#wpfb-cat-15. Food Security and Agriculture Productivity Project's Project Appraisal Document will be provided by PMU. The Consultant will also be provided with training or meeting hall (DoA Conference Hall) and the Project will host working lunch during the report presentation by the consultant to the review committee to certify for milestone payment.

The consultant will not be provided with any office space, travel facilities, equipment and other facilities other than those reflected above. However, there will be a designated counterpart staff (Project M&E Officer and Marketing Expert) to seek constant guidance on the requirement of the study and to facilitate administratively.