ACRONYMS

AMIS	:	Agriculture Management Information System
ASC	:	Agriculture Sub Centre
BRCH	:	Building Resilience to Climate Related Hazards
CBO	:	Community Based Organizations
DADO	:	District Agricultural Development Office
DLSO	:	District Livestock Service Office
EWS	:	Early Warning System
FFS	:	Farmers Field School
FGD	:	Focus Group Discussion
INGO	:	International Non-Government Organization
KII	:	Key Informants Interview
LSC	:	Livestock Service Centre
MoAD	:	Ministry of Agriculture Development
NARC	:	Nepal Agricultural Research Council
NGO	:	Non-Government Organization
PMU	:	Project Management Unit
PPCR	:	Pilot Program for Climate Resilience
VDC	:	Village Development Committee
WUG	:	Water User's Group

Contents

CHAPTER I: INTRODUCTION

1.1 General Information

Banke is one of the Terai districts of 25 pilot districts of Building Resilience to Climate Related Hazards Project (BRCH), situated in Bheri zoneof Mid-Western Development Region. Banke district expands in an area of 2337 square Km between Bardiya, Salyan, and Dang districts of Nepal and Baharaich district of India. Geographically, most (79.1%) of the district is plain area or Terai (< 300msl) while 20.6 per cent of land is within 300 to 1000 msl. Only 0.3% of land in Chure hills in the North reaches an altitude up to 1236 msl (Barnekow *et al.* 2005). Banke district is a rural district with 85 per cent of its 0.49 million population (2011 CBS) living in the forty-six VDCs and only 15 per cent in Nepalgunj municipality. This district is located in the latitude of 27º 50' to 28º 20'N and the longitude of 81º 30' to 82º 10' E (Figure 1).

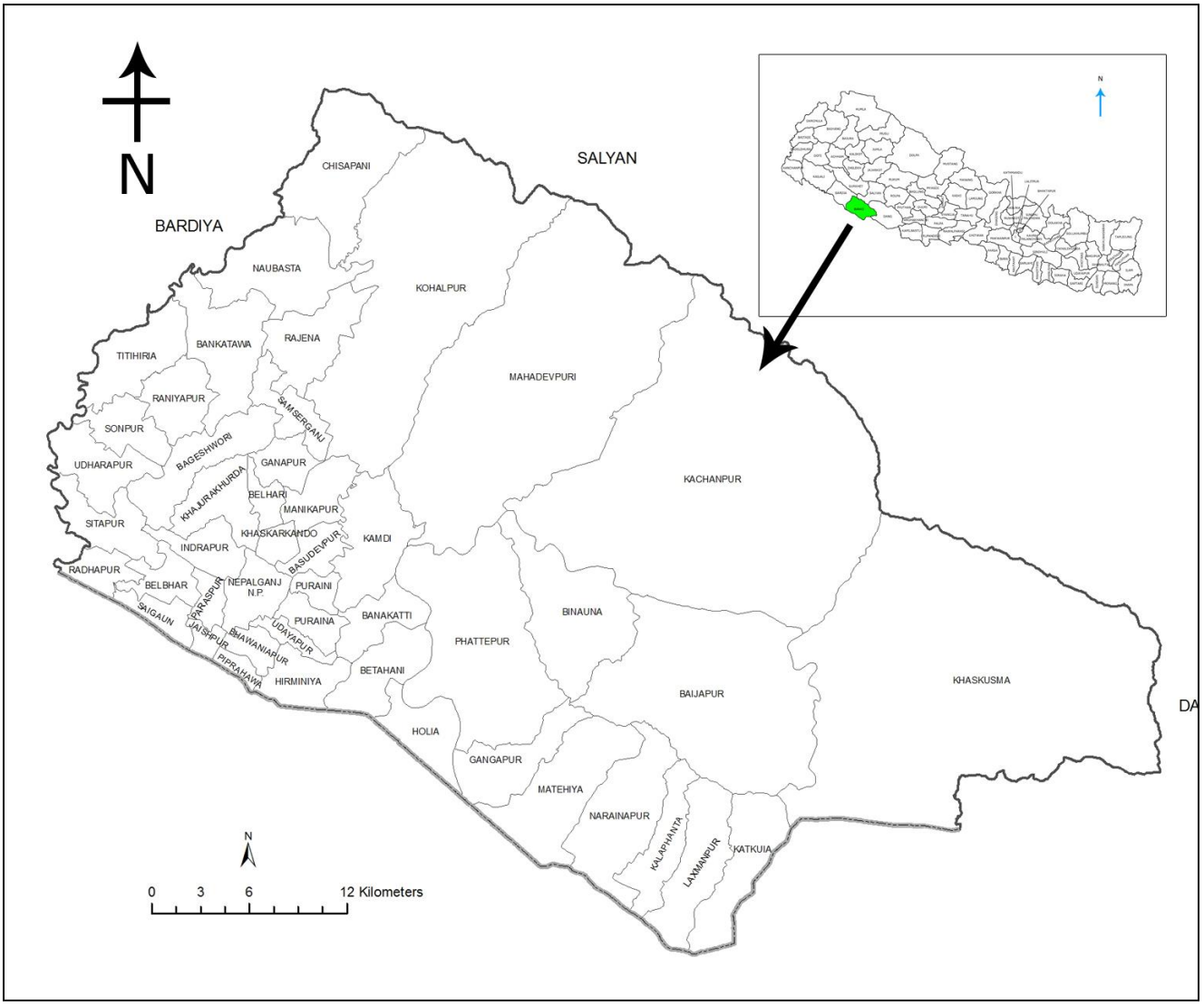

Figure 1: Location Map of Banke District

1.2 Land Utilization

Banke district consists large forest area and arable land accounts for about 25.35 per cent or 52.8 thousand ha (CBS 2011). Seventy one per cent of the cultivable land is Khet or low land (37.8 thousand ha) and the remaining 15 thousand ha is upland area. Agriculture in the district is predominantly rain-fed with only 21.9 per cent of the cultivable land with intermittent irrigation facilities.

Climate zone	Elevation range	% of Area
Lower tropical	Below 300 meters (1000 ft)	79.1%
Upper tropical	300 to 1000 meters (1000 to 3,300 ft)	20.6%
Sub-tropical	1000 to 2000 meters (3,300 to 6,600 ft)	0.3%

1.3`Climate

Banke district is a tropical district where the average maximum and minim temperature recorded between 2000-2010are 46 °C and 4.2 °C. Maximum rainfall recorded in the district was 1912 mm. Average wind speed is 3km/hour and average relative humidity is 71.4 per cent (DHM records of year between 2000 and 2010).

CHAPTER II: DEMOGRAPHIC AND SOCIO-ECONOMIC CHARECTERSTICS

This section focuses on the demographic and socio-economic characteristic like age and sex distribution of the HH heads, literacy and education, marital status, occupation, ethnicity, migration, ownership of the HH, sources of energy, toilet and health institution, income and expenditure, capital information, insurance etc.

Table1.1: Summary statistics of demographic and other household characteristics

Description	CBS, 2011	Base line survey 2015
Sex ratio (number of males per 100 females)	98.9	110.7
Dependency ratio		45.77
Household (HH) size	5.18	5.44
Percent of female headed households	22.30	12.35
HH (%) who own their housing unit	88.10	96.8
HH (%) with piped drinking water	14.61	6.63
HH (%) with access to electricity	68.74	87.84
HH (%) with access to Telephone/Mobile	66.24	87.86
HH (%) with toilet	48.26	77.00
HH (%) using firewood for cooking	71.44	75.69
Literacy rate	63.1	93.35

2.1 Population by age group and sex

The following table presents information on the distribution of population by age group and sex of the household members. The male population of 52.54 percent is higher than 47.46 percent of female population giving sex ratio of 110.7 in the district. About 24.21 percent of population were under 15 years and 7.82 percent were of 60 years or more old. Thus majority of population (69.98%) were from age group 15-59 years (Table 1.2).The survey data revealed that the overall dependency ratio is 45.77 percent. Regarding the HH size, the average HH size of the district is found to be 5.44 compared to 5.18 as of 2011 census.

Table 1.2: Distribution of population by age and sex

Age Group	Gender				Total	
	Male		Female			
	No.	%	No.	%	No.	%
1-4 Years	14394	2.79	12405	2.41	26799	5.20%
5-9 Years	24491	4.75	21212	4.12	45703	8.87%
10-14 Years	30205	5.86	22060	4.28	52265	10.14%
15-19 Years	34782	6.75	28564	5.54	63346	12.29%
20-24 Years	24681	4.79	30329	5.88	55010	10.67%
25-29 Years	25056	4.86	24017	4.66	49073	9.52%
30-34 Years	19315	3.75	16886	3.28	36201	7.02%
35-39 Years	22375	4.34	22759	4.42	45134	8.76%
40-44 Years	17993	3.49	17514	3.40	35507	6.89%
45-49 Years	16699	3.24	14677	2.85	31376	6.09%
50-54 Years	12440	2.41	7355	1.43	19795	3.84%
55-59 Years	6536	1.27	8368	1.62	14904	2.89%

60-64 Years	9031	1.75	6569	1.27	15600	3.03%
65+Years	12783	2.48	11901	2.31	24684	4.79%
Total	**270781**	**52.54**	**244616**	**47.46**	**515397**	**100.00%**

Source: Annex Table 1

2.2 Household head and members

Son/daughter constituted largest percentage (37.71%) of household members followed by household heads which constituted 18.37 percent of the population (Table 1.3).

Table 1.3: Percentage of population by relation to HH head and gender

Relation to HH Head	Gender					
	Male		Female		Total	
	No.	%	No.	%	No.	%
Head	83014	16.11	11683	2.27	94697	18.37
Husband/wife	4326	0.84	77617	15.06	81943	15.90
Son/daughter	130298	25.28	64070	12.43	194368	37.71
Grand children	22568	4.38	20648	4.01	43216	8.38
Son/daughter in law	14395	2.79	45457	8.82	59852	11.61
Daughter/son in law	442	0.09	4638	0.90	5080	0.99
Parent	2463	0.48	6947	1.35	9410	1.83
Father/mother in law	221	0.04	1547	0.30	1768	0.34
Brother/sister in law	11078	2.15	7984	1.55	19062	3.70
Household widow		0.00		0.00		0.00
Others	1989	0.39	4041	0.78	6030	1.17
Total	**270794**	**52.54**	**244632**	**47.46**	**515426**	**100.00**

Source: Annex Table 2

From the Table 1.3, it is seen that out of 18.37 percent household heads, female formed 2.27 percent of heads in comparison to 16.11 percent of male members who were household heads thus giving overall female household head percentage as 12.35 percent.

2.3 Marital Status of head of households

A total of 66.05 percent of HH members were married. Widow members of the household constituted 3.49 percent of the population. A total of 33.49 percent of population were married male whereas married female population accounted for 32.57 percent of total population.

Table 1.4: Population by marital status and gender in pilot districts

Marital Status	Gender				Total	
	Male		Female			
	Number	%	Number	%	Number	%
Married	148316	33.49	144244	32.57	292560	66.05
Divorced	916	0.21	474	0.11	1390	0.31
Separate	1105	0.25	442	0.10	1547	0.35
Widow/widower	3190	0.72	12251	2.77	15441	3.49
Unmarried	78374	17.70	53595	12.10	131969	29.80
Total	**231901**	**52.36**	**211006**	**47.64**	**442907**	**100.00**

Source: Annex Table 3

Female gender had higher percentage of widow (2.77%) than male gender (0.72%). Unmarried male constituted more (17.7%) of total population than unmarried female (12.1%).

2.4 Educational status, distance and time spent for schooling

According to 1991 census, literacy was defined as the "ability to read and write in any language with understanding and the ability to do simple arithmetic calculations". The same definition was used in the censuses of 2001 and 2011.
The literacy rate of the district of age 5 and above is found to be 93.35 percent compared to 63.1 percent in 2011 census showing that the literacy rate has been increased over the period of time. As regards to the educational status, the share of can read and write is high at 33.4 percent, is followed by primary level (17.73%), lower secondary (13.6%), secondary (11.43%), SLC/equivalent (6.8%) and inter/equivalent (4.31%). People having graduated and above graduate level are still found to have quite low at 2.83 percent. Following tables presents the educational status of the population of the district.

Table 1.5 Percentage of population by education level and gender

Education Level	Gender				Total	
	Male		Female			
	No.	%	No.	%	No.	%
Cannot read and write	17075	3.49	15405	3.15	32480	6.65
Can read and write	64384	13.18	98822	20.23	163206	33.40
Beginners	8776	1.80	7105	1.45	15881	3.25
Primary (1-5)	49810	10.19	36805	7.53	86615	17.73
L. Secondary (6-8)	41822	8.56	24618	5.04	66440	13.60
Secondary (9-10)	31878	6.52	23983	4.91	55861	11.43
SLC/Equivalent	19919	4.08	13319	2.73	33238	6.80
Inter/Equivalent	13067	2.67	7988	1.63	21055	4.31
Grad/Equivalent	6918	1.42	2306	0.47	9224	1.89
PG/Equi/above	2748	0.56	1864	0.38	4612	0.94
Total	**256397**	**52.47**	**232215**	**47.53**	**488612**	**100.00**

Source: Annex Table 4

2.5 Accessibility to Educational Institutions in terms of Distance and Time Spent

Currently 25.1 percent of the family members of age 5 and above are going to educational institutions. Survey data showed that proportion of them is higher in case of male than female, which constituted 26.1 percent and 24.07 percent of their population respectively.

Table1.6: Population by going to school (>5 years)

Going to School	Gender					
	Male		Female		Total	
	No.	%	No.	%	No.	%
Yes	66915	26.10	55837	24.07	122752	25.13
No	189472	73.90	176158	75.93	365630	74.87
Total	**256387**	**100.00**	**231995**	**100.00**	**488382**	**100.00**

As regards to the accessibility to educational institutions in terms of time, 73.90 percent of the respondents have reported that distance to reach is less than 1 km, whereas 15.17 percent reported distance of 1-5 km and only 1.8 percent reported distance of 5-10 km (Table1.7).

Table1.7 Population by distance to education institution (>5 years)

Distance	Gender		Total
	Male	Female	

	No.	%	No.	%	No.	%
Less than 1km	49146	40.03	41572	33.87	90718	73.90
1-5 km	9250	7.54	9374	7.64	18624	15.17
5-10 km	1326	1.08	884	0.72	2210	1.80
Greater than 10 km	7198	5.86	4008	3.26	11206	9.13
Total	**66920**	**54.51**	**55838**	**45.49**	**122758**	**100.00**

Source: Annex Table 6

Accessibility to educational institution by gender shows that 90.28 percent of the respondents have reported that institutions can be reached within less than 1 hour (Table 1.8). Also comparatively higher male (3.34%) than female (0.54%) travelled for more than 2 hours to reach the educational institution.

Table 1.8 Population by time taken to education institution (>5 years)

Time taken	Gender				Total	
	Male		Female			
	No.	%	No.	%	No.	%
Less than 1 hour	58772	47.88	52049	42.40	110821	90.28
1-2 hours	4042	3.29	3126	2.55	7168	5.84
More than 2 hours	4106	3.34	663	0.54	4769	3.88
Total	**66920**	**54.51**	**55838**	**45.49**	**122758**	**100.00**

Source: Annex Table 7

Regarding mode of transport, 75.85 percent of the population reported travelling on foot for educational institution, 10.72 percent using bicycle and 9.2 percent reported using vehicles like school bus (Table 1.9)

Table1.9: Population by mode of transportation to education institution (>5 years)

Mode of transport	Gender				Total	
	Male		Female			
	No.	%	No.	%	No.	%
On foot	49938	74.62	43183	35.18	93121	75.85
Bus	6628	9.90	4672	3.81	11300	9.20
Bicycle	6945	10.38	6219	5.07	13164	10.72
Foot and bus	2716	4.06	1547	1.26	4263	3.47
Other	695	1.04	221	0.18	916	0.75
Total	**66922**	**100.00**	**55842**	**45.49**	**122764**	**100.00**

Source: Annex Table 8

2.6 Occupation

As revealed from the table1.10, among various types of occupations adopted by the people, 35.41 percent of the population has adopted their main occupation as agriculture in their own land, and few segment of the population have adopted their main occupation as agriculture in the basis of salary/wage worker, which accounted for only 2.99 percent of the population. Household work as their occupation accounting for 19.82 percent is followed by student as their occupation accounting for 18.53 percent. About 11.08 percent of the population was engaged in non-agricultural salaried work, is followed by external jobs in abroad accounting for 4.70 percent. Occupational pattern is more or less same in case of male and female except in case of salaried non agriculture occupation and abroad external job where female participation is quite low i.e. only 2.25 and 0.20 percent in comparison to 8.82 and 4.32 percent reported by male.

Table 1.10: Distribution of population by types of occupation

Main Occupation	Gender		Total
	Male	Female	

	No.	%	No.	%	No.	%
Own agriculture	89096	20.12	67724	15.29	156820	35.41
Salaried/wage agriculture	11049	2.49	2210	0.50	13259	2.99
Non agriculture salary	39082	8.82	9982	2.25	49064	11.08
Own enterprises	4013	0.91	2085	0.47	6098	1.38
Abroad external job	19156	4.32	884	0.20	20040	4.52
Household work	7485	1.69	80309	18.13	87794	19.82
Student	45832	10.35	36235	8.18	82067	18.53
No work	11238	2.54	9564	2.16	20802	4.70
Other	4957	1.12	2021	0.46	6978	1.58
Total	**231908**	**52.36**	**211014**	**47.64**	**442922**	**100.00**

Source: Annex Table 9

2.7 Migration

Among the migrated population, looking for work is the main reason for migration as has been reported by 13.77 percent of the households, followed by 2.61 percent for education/training purpose and 0.45% for easier lifestyle.

Table 1.11: Reasons of migration of the HH's members

Reason for Migration	HH	
	No	%
Family reason	442	0.22
Education/training	5176	2.61
Natural disaster	0	0.00
Looking for work	27263	13.77
Easier lifestyle	883	0.45
No migration	159392	80.49
Other reason	4859	2.45
Total	**198016**	**100.00**

Source: Annex Table 12

2.8 Alignment of HH Members with Institutions

For facilitating the transaction or to get knowledge about something, different people get associated in different institutions. Among the people who are associated with various institutions, 4.48 percent of the population are associated with saving and credit cooperative followed by agricultural cooperative group (3.52%). Association with the institutions such as, vegetable group, water user group, commercial crop production, agriculture marketing group is almost negligible. However, other than the above mentioned institutions, their associations in category 'others' are found to be 1.44 percent.

Table 1.12: Members of the households (>=10 years) associated with different institutions

Types of organizations	Gender					
	Male		Female		Total	
	No.	%	No.	%	No.	%
Farmers Field School	3222	0.73	1579	0.36	4801	1.08
Vegetable	442	0.10	695	0.16	1137	0.26
Water Users Group	253	0.06	0	0.00	253	0.06
Commercial Crop Production	663	0.15	0	0.00	663	0.15
Saving credit co-operative	5588	1.26	14233	3.21	19821	4.48
Agricultural co-op group	7543	1.70	8049	1.82	15592	3.52
Agriculture marketing	1326	0.30	0	0.00	1326	0.30
Seed production	0	0.00	0	0.00	0	0.00
Other	2969	0.67	3409	0.77	6378	1.44

Not in Group	209898	47.39	183042	41.33	392940	88.72
Total	**231904**	**52.36**	**211007**	**47.64**	**442911**	**100.00**

Source: Annex Table 10

2.9 Ethnicity

As per the table 1.13, the distribution of population by ethnicity revealed that majority of the population residing in the district constituted Adibasi/Janajati, which accounted for 30.57 percent of the total population, followed by Brahmin/Chhetri (21.88%), Madhesi (21.38%) and Dalit (11.29%).

Table 1.13: Distribution of population by ethnicity

Ethnicity	Gender				Total	
	Male		Female			
	No.	%	No.	%	No.	%
Adibasi/Janajati	77475	15.03	80094	15.54	157569	30.57
Brahman/Chhetri	56825	11.03	55939	10.85	112764	21.88
Dalit	31501	6.11	26701	5.18	58202	11.29
Madhesi	59510	11.55	50703	9.84	110213	21.38
Others	45476	8.82	31179	6.05	76655	14.87
Total	**270787**	**52.54**	**244616**	**47.46**	**515403**	**100.00**

Source: Annex Table 11

2.10 Housing Ownership

Regarding the ownership of the houses, almost all the HH (96.8%) reported that they have their own houses. Very insignificant number of HH is found to have rented or lived in relative's house or lived in land owner's house

Table 1.141: Distribution of ownership of houses by types of houses

Types of house ownership	HH	
	No.	%
Own house	91659	96.80
Rented house	1928	2.04
Relative's house	1105	1.17
Land owner's house (included in rented land)	0	0.00
Institutional house	0	0.00
Total	**94692**	**100.00**

Source: Annex Table 13

Pakki house is defined as a house built with both walls and roof made from permanent materials like cement, concrete and bricks. Semi-Pakki is house with either wall or roof constructed by temporary materials like tin/tile/slate roofing and bamboo. Kachchi house is a house with both walls and roof made from temporary material such as mud, straw, bamboo and other endurable materials such as straw, plastics etc.

Among those, who have owned house, majority (47.06%) of the HH were found to have lived in Semi-pakki houses, 33.77 percent in concrete roof/Pakki houses and only 19.17 percent of the respondents are found to have lived in Kachi/Thatch roofed houses.

Table 1.152: Distribution of houses by types of houses

Type of residential house	HH	
	No.	%
Concrete roof/pakki/cemented	31983	33.77
Semi-pakki (tin/tile/slate roof)	44564	47.06
Kacchi- thatched roof	18149	19.17

Others	0	0.00
Total	**94696**	**100.00**

Source: Annex Table 14

2.11 Households Asset

The most common assets owned by the people are found to be telephones/mobile phones reportedly constituting 27.03 percent of household items followed by fan/heater, cycles, assets including jewellery, TV and radio/CD player constituting 23.68, 16.98, 10.14, 9.47 and 4.25 percent of the asset items. An attempt has been made to calculate the salvage value of the assets owned by the HH in the current market value. Expensive assets like jewellery formed largest (51.37%) portion of the net value of the all the assets owned by the households followed by tractor/power tiller, motorcycle/scooter, TV and telephone/mobile constituting 14.19, 10.51, 5.16 and 4.92 percent portion of the net value of the assets. Insignificant proportion of the net value was represented by the assets like refrigerators, washing machine, sewing machine etc.

Table 1.16: Distribution of different type of assets and their value

Types of assets	Items		Approximate current value	
	No.	%	(Rs)	%
Radio/ cd player	30589	4.25	33903208	0.34
Cycles	122214	16.98	173154639	1.75
Motorcycle/scooter	20296	2.82	1039280736	10.51
Car/jeep	0	0.00	0	0.00
Bus/truck	1389	0.19	443711784	4.49
Telephone/mobile	194499	27.03	486295726	4.92
Washing machine	0	0.00	0	0.00
Refrigerator	442	0.06	5521750	0.06
Sewing machine	10955	1.52	46327770	0.47
Fan/heater	170404	23.68	169255733	1.71
TV	68185	9.47	510712315	5.16
Assets including Jewelries	72943	10.14	5080139730	51.37
Tractor/power tiller	4923	0.68	1402949270	14.19
Thresher/pump set/sprayers	220.87	0.03	1766960	0.02
Mill/Ghatta/turbine	1104	0.15	178462960	1.80
Others	21493	2.99	318105339	3.22
Total	**719656**	**100.00**	**9889587920**	**100.00**

Source: Annex Table 15

2.12 Food Security Status

Sufficiency of food and its security to the farmers from their farm is an important indicator of economic status of the farmers. In this regards, substantial proportion of the HH (36.79%) have reported they have food sufficiency for12 or more months. A total of 18.33% of the HH have reported that food is sufficient for 9 to 12 months, indicating that majority of the HH have food sufficiency.

Table 1.173: Food sufficiency of the HH by duration

Food sufficiency level	HH	
	No.	%
Less than 3 months	11842	12.51
3 to less than 6 months	15404	16.27
6 to less than 9 months	15244	16.10
9 to less than 12 months	17359	18.33
12 months or surplus	34839	36.79
Total	**94688**	**100.00**

Source: Annex Table 16

2.13 Source of Energy

As regards to the source of energy for lighting, almost all the households (87.84%) have electricity, 7.93 percent households have used kerosene for lighting, and insignificant percent have used solar and biogas for lighting.

Among various sources of energy for cooking, firewood remained a main fuel for cooking, accounting for 75.69% of the total HH. About 17.98% and 5.17% of the HH have used gas cylinder and biogas for cooking.

Table 1.18: Distribution of HH by sources of fuel for lighting and cooking (%)

Purpose	Main source of energy	HH	
		No.	%
Light	Electricity	83176	87.84
	Biogas	221	0.23
	Solar	2430	2.57
	Kerosene	7510	7.93
	Other	1358	1.43
	Total	**94695**	**100.00**
Cooking fuel	Timber/ firewood	71675	75.69
	Cow dung cake	1105	1.17
	Straw/ dry grass/ eaves/rubbish	0	0.00
	Cylinder gas	17024	17.98
	Biogas	4891	5.17
	Kerosene	0	0.00
	Other	0	0.00
	Total	**94695**	**100.00**

Source: Annex Table 17 and 18

2.14 Source of Drinking water

Source of drinking water refers to the place from where households draw water for drinking and cooking foods for household members. Hand pump/tube well as a source of drinking water was reported by 93.10% of the HH followed by piped water (6.63%). Thus it can be inferred that still substantial percent of households have no access to safe drinking water.

Table 1.19: Distribution of HH reporting different sources of drinking water

Source	HH	
	No	%
Piped water	6282	6.63
Covered well	253	0.27
Hand pump/tube-well	88158	93.10
Open well	0	0.00
Spring water	0	0.00
River	0	0.00
Other	0	0.00
Total	**94693**	**100.00**

Source: Annex Table 19

2.15 Toilet Facility

In view of health and healthy environment sanitation is an integral part of life. As revealed from the survey data, there has been significant improvement in the accessibility of toilet in both rural and urban area. Majority of HH (77%) have access to toilet in their HH indicating wide spread effect of recent

campaigns on making districts open defecation free. Majority (46.23%) of the HH have reported that they have toilet without flush followed by toilet with flush (connected to safety tank) 29.80% . Very insignificant percentage (0.73%) of people have toilet with flush connected to sewer and 5.86% of HHs reported no toilet.

Table 1.20: Distribution of HH using different type of toilets

Types of toilet used	HH	
	No.	%
Toilet with flush (connected to sewer)	695	0.73
Toilet with flush (connected to safety tank)	28219	29.80
Toilet without flush	43782	46.23
Public toilet	221	0.23
No toilet	21778	23.00
Total	**94695**	**100.00**

Source: Annex Table 20

2.16 Households Consulting Health Institutions

There are various kinds of health institutions prevailing in the district. Among all, private hospitals cater substantial percentage of households (47.53%), which is followed by government's health post/centers (17.63%), government district hospital (17.34%) and private pharmacy/clinic (9.63%). Government other institutions and other privates providing services for 4.60% and 3.03% of HHs. Ayurveda and mobile centers center were cited by none and negligible portion of the households.

Table 1.21: Distribution of HH consulting different health institutions

Health service provider	HH	
	No.	%
Government health post/PHC	16695	17.63
Government district hospital	16422	17.34
Government mobile clinic	221	0.23
Government Ayurveda center	0	0.00
Government other institution	4358	4.60
Private hospital	45011	47.53
Private pharmacy/clinic	9123	9.63
Private health worker's home		0.00
Private others	2872	3.03
Total	**94702**	**100.00**

Source: Annex Table 21

2.17 Households Income and Expenditure

Income and expenditure measure the status of the living of any HH. Excess in income than expenditure brings the lively whereas excess in expenditure drives one to debt making life hard. Thus HH's income and expenditure are two major indicators to measure how and where he stands.

Expenditure can be considered as the ability to expend to some extent for better livelihood in accordance to one's income. The survey result showed that food constituted highest part of expenditure with 25.01% followed by 17.83 % expenses on education, 12.09% in apparel and personal items and 11.97% on health.

Table 1.22: Expenditure distribution of HH by different items

Items of expenditure	HH (No).	Total expenditure		Average expenditure/HH (Rs)
		Rs	%	
Food	93778	3683564011	25.01	38898

Fuel	50796	614613785	4.17	6490
Apparel and personal items	93147	1780261985	12.09	18800
Social and religious activities/donation/charity	73638	883041028	6.00	9325
Insurances and taxes	62559	310324097	2.11	3277
Repair and maintenance of house, vehicles, equipment	49459	378712409	2.57	3999
Transportation	87465	721217661	4.90	7616
Newspaper/communication	66759	449414933	3.05	4746
Disaster related expenses	15369	107720395	0.73	1138
Input cost for agriculture/livestock/other enterprises	65868	1086495055	7.38	11473
Health	86613	1762288011	11.97	18610
Education	66663	2625435516	17.83	27725
Cash losses	6060	241811731	1.64	2554
Other	6216	82324290	0.56	869
Total	**n=94697**	**14727224905**	**100.00**	**155519**

Source: Annex Table 22

As regards to the income of the HH in the district, nonagricultural wages/salary was found to be major contributor to total annual income, which accounted for 47.73 percent followed by agricultural wages/labor (33.20%), and sale of agricultural products (30.66%). Remittances come to be fourth position with contribution of 16.50 percent of the income. Combining the income from different heading as given in the following table the average income is found to Rs.179545.

Table 1.234: Income distribution of HH by different sources

Major source of household income	HH (No.)	Total income		Average income/HH (Rs)
		Rs	%	
Agricultural wages/labor	31436	1217935032	33.20	12861
Nonagricultural wages/salary	45202	6265841162	47.73	66167
Sale of agricultural products	29034	1463803172	30.66	15458
Livestock/fisheries sale	20798	872256309	21.96	9211
Milk and milk product sale	11554	521998178	12.20	5512
Remittances	15622	3885316268	16.50	41029
Occupational work (tailoring, black smithy, carpentry etc)	2903	281095398	3.07	2968
Forestry related products sale	221	3313050	0.23	35
Pension	6188	669770925	6.53	7073
Own enterprise	8208	1164210710	8.67	12294
Others	11112	656843532	11.73	6936
Total	**n=94697**	**17002383736**	**100.00**	**179545**

Source: Annex Table 23

From the analysis of income and expenditure, it can be concluded that on an average there is a per annum surplus of income by Rs.20026 per household.

2.18 Credit Situation

Credit is one of the important economic indicators, which is taken either to sustain the present status of life or to invest on something else in order to take benefit from the investment. In this regards, a total of 44.46 percent of households have taken loan during the last 12 months.

Table1.24: Frequency and percentage of HH taking loan

Loan taken	HH	
	No.	%
Yes	42101	44.46
No	52588	55.54
Total	**94689**	**100.00**

Source: Annex Table 24

2.19 Agricultural Insurance for Protecting Risks on Crops and Livestock

It is evident that climate change is becoming alarming to the survival and there is a growing threat of climate and weather related risks on crop and livestock. A total of 67.10 percent of the households have reported that there is presence of climate and weather related risks on crops and livestock production.

Table1.25: Distribution of HH reporting presence of climatic and weather related risks in agriculture

Possibility of risks on crop/livestock	HH	
	No.	%
Yes	63533	67.10
No	31158	32.90
Total	**94691**	**100.00**

Source: Annex Table 25

Among the households reporting presence of climate and weather related risks, the risk of diseases and pests in cereals and vegetable was found to be from 40.08 to 54.17 percent. Similarly drought was reported by 26.97 percent to 35.54 percent households as risk on potato and vegetable respectively. Risk of flood on rice, mustard, and potato was reported by 19.47, 10.25, and 9.84 percent of households while risks due to hailstone on wheat, maize and rice was reported by 11.88, 7.79, and 6.38 percent of households respectively.

Table 1.26: Distribution of HH reporting high risks in various crops/livestock due to climatic hazards

Crop/ livestock	No of HH and %	Risks in crops and livestock due to climatic hazards						
		Disease pest	Drought	Flood	Hail stone	All	Others	Total
Rice	No of HHs	58450	45226	28400	9309	3976	474	145835
	%	40.08	31.01	19.47	6.38	2.73	0.32	100.00
Wheat	No of HHs	44913	34339	5333	11582	883	474	97524
	%	46.05	35.21	5.47	11.88	0.91	0.49	100.00
Maize	No of HHs	27677	18967	4670	4450	883	442	57089
	%	48.48	33.22	8.18	7.79	1.55	0.77	100.00
Mustard	No of HHs	19505	10068	3787	1767	1136	695	36958
	%	52.78	27.24	10.25	4.78	3.08	1.88	100.00
Vegetable	No of HHs	16220	10666	1988	883	253		30010
	%	54.05	35.54	6.62	2.94	0.84	0.00	100.00
Potato	No of HHs	14770	7353	2683	1357	663	442	27267
	%	54.17	26.97	9.84	4.98	2.43	1.62	100.00
Cow	No of HHs	12686	663	-	-	-	-	13349
	%	95.04	4.96	-	-	-	-	100.00
Buffalo	No of HHs	14770	221	-	-	-	-	14991
	%	98.53	1.47	0.00	-	-	-	100.00
Sheep	No of HHs	663	-	221	-	-	-	883
	%	75.00	-	25.00	-	-	-	100.00
Goat	No of HHs	21332	-	-	-	-	221	21553

	%	98.98	-	0.00	-	-	1.02	100.00
Chyangra	No of HHs	221	-	-	-	-	-	221
	%	100.00	-	-	-	-	-	100.00
Chicken	No of HHs	11393	221	-	221	-	-	11835
	%	96.27	1.87	-	1.87	-	-	100.00
Duck	No of HHs	1389	253	-	-	-	-	1642
	%	84.60	15.40	-	0.00	-	-	100.00
Other	No of HHs	4040	1357	474	442	-	-	6313
	%	63.99	21.50	7.51	7.00	-	-	100.00
Total	No of HHs	248029	129334	47555	30010	7795	2747	465470
	%	53.29	27.79	10.22	6.45	1.67	0.59	100.00

Source: Annex Table 26 (Figures in the above table is multiple answer does not match with 100%)

Regarding the risk on livestock species, all species are reported to be vulnerable to risks of diseases and pests as well as risk of drought to some extent. As 98.98 percent of the household have reported that goat was more prone to risks due to diseases and pests followed by buffalo (98.53%), cow (95.04%) and chicken (96.27%). Drought effects were reported by 15.4 percent in duck followed by 4.96% in cow and 1.87% in chicken.

In order to protect from the risk of damage of valuable property insurance is a means of reimbursement of one's property. There are number of insurance companies actively working in this field. In regards to it, an enquiry into the knowledge on insurance companies and schemes, it is interesting to note that 10.97% of the HH are found to have known about it.

Table 1.27: Frequency and percentage of households having knowledge of insurance

Knowledge on crop/ livestock insurance	**HH**	
	No.	**%**
Yes	10386	10.97
No	84308	89.03
Total	**94694**	**100.00**

Source: Annex Table 27

Among the household who have knowledge on crop/livestock insurance none of household has insurance their livestock.

Table 1.28: Frequency and percentage of households having Insuring of crop/livestock

Insuring of crop/livestock in last year	**HH**	
	No.	**%**
Yes	0	0.00
No	10386	100.00
Total	**10386**	**100.00**

Source: Annex Table 28

2.20 Reasons for Non-Insuring

Though there were so many types of hazards likely to occur due to climate change in crops and livestock, none of the HH are found to have insured their crops and livestock. Some people might not be willing to insure and pay the premium and some people might not know about insurance and its policy. However, an enquiry on it revealed that 40.41% respondents cited no access to the service followed by poor insurance service (26.43%) and problem in getting back the insured amount (10.88%) were the major reason for non-insuring.

Table 1.29: Frequency and percentage of household reporting reason for not doing insurance

Reason for not doing insurance	**HH**	
	No.	**%**
Lack of information	0	0.00

High premium rate	442	7.25
No access to the service	2462	40.41
Poor insurance service	1610	26.43
Problem in getting back the insured amount	663	10.88
Others	916	15.03
Total	**6092**	**100.00**

Source: Annex Table 29

TV/Radio, insurance agent and leader farmer/neighbor/relatives were reported as major sources of information on agriculture insurance reported by 40.86, 29.57 and 24.64 percent of the respondents

Table 1.30: Frequency and percentage of households reporting source of information on agricultural insurance

Source	**HH**	
	No.	**%**
Insurance agent	1325	29.57
DADOs/DLSOs	883	19.71
Newspaper	695	15.50
TV/Radio	1831	40.86
ASCs/LSCs	916	20.43
Leader farmer/Neighbor/Relatives	1104	24.64
Other	442	9.86
Total	**4482**	**100.00**

Source: Annex Table 32

Out of 12751 households, only 4359 (34.19%) reported having knowledge about 75 percent subsidy on agriculture insurance.

Table 1.31: Frequency and percentage of households reporting 75% subsidy on agricultural insurance premium

Response	**HH**	
	No.	**%**
Yes	4359	34.19
No	8392	65.81
Total	**12751**	**100.00**

Source: Annex Table 33

CHAPTER III: AGRICULTURE AND AGRICULTURE RELATEDPRODUCTION AND PRODUCTIVITY

As majority of the population rely on agriculture for their livelihood, land holding is common and integral part of life. In this context, this chapter focuses on land holding, land use by type, cropped area with cropping patterns, crop production, marketing of farm product, livestock, poultries and fisheries, milk and milk product.

3.1 Land Holding

In this regards, almost all the households (87.56%) in the district have owned their land.

3.2 Use of Land by Type

Usually in Nepal, land use in general can be classified into six categories viz. (i) Temporary crops (ii) Temporary meadow (iii) Temporary fallow (iv) Permanent crops (v) Permanent meadow and (vi) Appropriate for forest and (vii) Appropriate for fishery. Temporary crop was grown with average area of 0.0994 ha/HH and overall irrigated land is 0.0371 ha/HH with average number of parcel land is 1.65. Very insignificant land was used for temporary graze land, the average area of which is found to be 0.0347 ha. Use of temporary fallow is also very low with average area 0.0318 ha/HH. Except for temporary crop, the use of land for permanent crops is slightly more, the average area covered is 1.0235 ha/HH with average irrigated area of 0.6590 ha. The land use for permanent meadow is also very low, the average area of which is 0.0046. Average land appropriate for forest was found 0.4739 ha.

Table 2.15: Distribution of HH using land by type

Type of land	Ave. area (ha)	Ave. no. of parcel	Ave. irrigated (ha)
Temporary crop	.0994	1.65	0.0371
Temporary graze land	.0347	3.50	0.0134
Temporary fallow	.0318	2.60	0.0063
Permanent crops	1.0235	2.50	0.6590
Permanent graze land	.0046	2.67	0.0018
Appropriate for forest	.4739	6.00	0.0016
Appropriate for fishery	.0000	0.00	0.0000
No of HH			**94693**

Source: Annex Table 35

3.3 Source of Irrigation:

Out of 4263 respondents, who have managed to irrigate in their field with different sources of irrigations for temporary crops, majority (20.74%) of the HH have reported that their source of irrigation was continuous flow canal managed by the people themselves, which is followed by tube well, boring (16.30%), pond/well (10.37%) and mixed (10.37%). Similarly continuous flow canal was reported as source by 25.15 percent respondents in case of irrigated agricultural land followed by tube well, boring (17.89%).

Table 2.2: Distribution of HH by sources of irrigation in the district

Sources of irrigation	Temp. crops		Irrigated agriculture land		Temp Graze		App. forest	
	No.	%	No.	%	No.	%	No.	%
Tube well, boring	695	16.30	11048	17.89	-	-	-	-
Continuous flow canal	884	20.74	15527	25.15	-	-	-	-

Natural flow canal	221	5.18	3664	5.93	-	-	-	-
Pond/ well	442	10.37	1767	2.86	-	-	-	-
Mixed	442	10.37	663	1.07	-	-	-	-
Others	1579	37.04	29069	47.08	-	-	-	-
Total	**4263**	**100.00**	**61738**	**100.00**	**-**	**-**	**-**	**-**

Source: Annex Table 35, 36, 37, and 38

Leased land

Few segment of population (7.74%) have given land to others on lease and the average holding of leased out land is 0.0839 ha/household.

Table 2.3: Frequency and percentage of households reporting leased out land and holding seize

Leased out land			HH	
	Area (ha)	Mean (ha/HH)	No.	%
Khet	15776.29	.1666		
Bari	121.85	.0013		
Total	**15898.14**	**.0839**	**7327**	**7.74**

Source: Annex Table 41 and 42

A total of 14675 households (15.50%) had owned land on lease from others.

Table 2.4: Frequency and percentage of households reporting leased out land and holding seize

Leased in land	HH	
	No.	%
Yes	14675	15.50
No	80022	84.50
Total	**94697**	**100.00**

Source: Annex Table 43

Out of 26393.71 ha leased in land, major portion i.e. 19856.47 ha (75.23%) of land are found to have leased on crop sharing basis followed by contract (cash) basis 6095.67 ha (23.09%). There are various ways of leasing land in the district viz. contract (kind), exchange for service, mortgage and other, however the proportion of them is found to be low.

Table 2.5: HH reporting leasing land by type of land tenure system

Type of land tenure system	Particulars	Khet	Bari	Orchard	Pond	Total
Contract (cash)	Sum (ha)	6095.67	0.00	0	0.00	6095.67(23.09%)
	Mean (ha/HH)	.0644	0.0000	0.00	0.0000	0.06
Contract (kind)	Sum (ha)	299.17	0.00	0	0	299.17(1.13%)
	Mean (ha/HH)	.0032	0.0000	0.00	0.00	0.00
Crop sharing	Sum (ha)	19632.09	224.38	0.00	0	19856.47(75.23%)
	Mean (ha/HH)	.2073	.0024	0.0000	0.00	0.21
Exchange for service	Sum (ha)	0.00	0.00	0	0	0.00
	Mean (ha/HH)	0.0000	0.0000	0.00	0.00	0.00
Mortgage	Sum (ha)	142.11	0.00	0	0	142.11(0.53%)
	Mean (ha/HH)	.0015	0.0000	0.00	0.00	0.00
Others	Sum (ha)	0.00	0.00	0	0	0.00
	Mean (ha/HH)	0.0000	0.0000	0.00	0.00	0.00
					Total	**26393.71**

Source: Annex Table 44

3.4 Cropping Patterns and Cropped Area

Rice-Wheat-Fallow (48.89%) and Rice-Fallow-Fallow (14.64%) and Rice-Wheat-Maize (9.74%) were major cropping pattern of khet land with mean land holding of 0.4506, 0.1349 and 0.0897 ha/HH.

Table 2.6: Cropping patterns in Khet land and mean land holdings area

Type of cropping pattern	Total area (ha)	Percentage of total land area (%)	Mean (ha/HH)
Rice-Rice-Wheat	3716.68	4.26	.0392
Rice-Wheat-Fallow	42668.73	48.89	.4506
Rice-Wheat-Maize	8497.25	9.74	.0897
Rice-Wheat-Vegetable	2854.20	3.27	.0301
Rice-Pulses-Fallow	3279.12	3.76	.0346
Rice-Wheat-Moong (green gram)	4768.71	5.46	.0504
Rice-Wheat-Dhaincha (Sun hemp)	0.00	0.00	0.0000
Rice-Potato-Fallow	269.26	0.31	.0028
Rice-Maize-Fallow	1069.55	1.23	.0113
Rice-Fallow-Fallow	12777.74	14.64	.1349
Rice-Barley-Fallow	0.00	0.00	0.0000
Rice-Millet-Fallow	0.00	0.00	0.0000
Other	7365.67	8.44	.0778
Total (n= 94693)	**87266.89**	**100.00**	**.9216**

Source: Annex Table 45

Others (63.48%), Maize- Rice-Wheat (9.02%), Maize-Tori-Fallow (7.51%) and Vegetable-Vegetable (7.18%) were major cropping pattern in bari land.

Table 2.76: Cropping patterns in Bari land and mean Bari land area

Type of cropping pattern	Total area (ha)	Percentage of total land area (%)	Mean (ha/HH)
Maize/Upland rice-Fallow	31.79	0.74	.0003
Maize/Millet-Fallow	254.30	5.90	.0027
Maize/Millet-Wheat	29.92	0.69	.0003
Upland rice-Fallow-fallow	0.00	0.00	0.0000
Maize-Tori-Fallow	323.79	7.51	.0034
Maize- Rice-Wheat	388.93	9.02	.0041
Maize-Barley	0.00	0.00	0.0000
Jute-Tori-Fallow	0.00	0.00	0.0000
Jute-Wheat- Fallow	0.00	0.00	0.0000
Vegetable-Vegetable	309.54	7.18	.0033
Vegetable-Maize	185.42	4.30	.0020
Off season vegetable	50.32	1.17	.0005
Others	2735.51	63.48	.0289
Total (n= 94693)	**4309.51**	**100.00**	**.0455**

Source: Annex Table 46

3.5 Use of improved seeds

About 42.53 percent of the HHs reported to have used improved seeds. Among this 96.57 percent households were using improved seeds of rice followed by wheat 12.91 percent and maize 5.66 percent.

Table2.8: HH using improved seeds (%)

Use of improved seeds	HH	
	No.	%
Yes	40273	42.53
No	54424	57.47
Total	**94697**	**100.00**

Source: Annex Table 45 and 46

Table2.9: HH using different kinds of seeds (%)

Commodity	HH	
	Nos	%
Rice	38251	96.57
Wheat	5112	12.91
Maize	2241	5.66
Oilseed	0	0.00
Pulses	442	1.12
Vegetables	1357	3.43
Potato	0	0.00
Sugarcane	0	0.00
Other	0	0.00
Total	**39608**	**100.00**

Source: Annex Table 45 and 46

3.6 Marketing of Farm Product

Following table presents the distribution of HH selling their farm product in different places. Farm gate is found to be the major place where 51.03 percent of households sell their products, which is followed by district market accounting for 7.30 percent of households. Only 7.21 percent of household sells their product in sell centers followed by vendor (5.67%).

Table 2.10: Frequency and percentage of HH selling produce at different places

Place of sale	HH	
	No.	%
Farm gate	18746	51.03
Rural haat bazar	1988	5.41
District market	2683	7.30
Vendor	2084	5.67
Cooperatives	1104	3.01
Sell centers	2650	7.21
Others	8586	23.37
Total	**36737**	**100.00**

Source: Annex table 49

3.7 Use of Chemical Fertilizers and Pesticides

As regards to the use of chemical fertilizer and pesticides out of a sample of 94693 HH, 59.89 percent of the households have used chemical fertilizers and pesticides.

Table 2.11: Use of fertilizer and pesticides by the households

Use of chemical fertilizer and pesticides	HH	
	No	%

Yes	56714	59.89
No	37979	40.11
Total	**94693**	**100.00**

Source: Annex Table 50

As has been reported by MoAD, the total amount of fertilizer sold in the district is divided by the cultivated area to obtain average amount of Nitrogen, Phosphate and Potash used in farm in different varieties of crops, which is given in the following table. However, the amounts of different fertilizer nutrients used are all lower than the recommended dose in all kinds of crops whether it is irrigated or rain-fed.

Table 2.12: Amount of fertilizer nutrients used by HH in different crops (kg/ha)

Nitrogen	Phosphate	Potash
30.72	10.04	0.33

Source: MoAD (2014)

From the following table, it is clear that out of 4466 households using fertilizers and pesticides, 78.75 percent of households reported that fertilizers and pesticides were available as and when needed.

Table 2.13: Frequency and percentage of households reporting availability of chemical fertilizer and pesticides

Response	HH	
	No.	%
Yes	44662	78.75
No	12055	21.25
Total	**56717**	**100.00**

Source: Annex Table 51

3.8 Sources of Fertilizers/Pesticides

There are various sources of buying fertilizers/pesticides for the use of agricultural purposes. Among them cooperatives was the main source, from where 41.88 percent of the HH buy them, followed by agro-vets (39.11%).

Table 2.14: HH buying fertilizers/pesticides from different sources (%)

Source	HH	
	No.	%
Cooperatives	15782	41.88
Agro vets	14738	39.11
DADOs/ASCS	1389	3.69
Neighbor farmers	0	0.00
Relatives	0	0.00
Others	6911	18.34
Total	**37685**	**100.00**

Source: Annex Table 52

A total of 13762 household reported that they get the information on safe use of fertilizer and pesticides. Out of them 67.20% of HHs get information from purchasing shop followed by friends (13.31%) and neighboring farmers (6.65%).

Table 2.15: Frequency of households reporting source of information for safe use of fertilizer and pesticides

Source	HH	
	No.	%
From Purchasing Shop	9248	67.20
Extension Service	663	4.81

Neighboring Farmers	916	6.65
Friends	1831	13.31
Relatives	883	6.42
Own Experience	663	4.81
Other	0	0.00
Total	**13762**	**100.00**

Source: Annex Table 53

3.9 Reason for Low Use of Fertilizers/Pesticides:

An enquiry into the reason for inadequate use of fertilizer nutrients/pesticides by the farmers, lack of money is reported by 48.57 percentage of the HH and non-availability in time was reported by 30.30 percent households.

Table 2.16: HH reporting reasons for low use of fertilizers/pesticides

Reason	HH	
	No.	%
Not available	15158	30.30
No money	24302	48.57
Other	10574	21.13
Total	**50034**	**100.00**

Source: Annex Table 54

There is very low existence of advice on safe use of fertilizer and pesticides as only 18.73 percent of households reported its existence.

Table 2.17: HH reporting on advisory on safe use of fertilizer and pesticides

Response	HH	
	No.	%
Yes	17739	18.73
No	76957	81.27
Total	**94696**	**100.00**

Source: Annex Table 55

3.10 Livestock Production

Livestock is closely associated with agricultural occupation of the population, hence is an integral part of agriculture for their livelihood. Those who have adopted agriculture as their main occupation, used to hold the livestock as well, as such 76.36 percent of the households have held livestock.

Table 2.18: Frequency and percentages of households raising livestock

Response	HH	
	No.	%
Yes	72307	76.36
No	22388	23.64
Total	**94695**	**100.00**

Source: Annex Table 56

The distribution of types of breeds of livestock owned by the HH is presented in the following table. As revealed from the same table majority of the HH have raised local breeds of all kinds of livestock such as cattle, buffaloes, goats and pigs. Improved breeds of cows, buffaloes and goat were raised by 3.45, 3.10 and 2.44% of HH.

Table 2.197: Types of breeds of livestock owned

Animal	Type	HH (%)	HH	Animal (no.)	Mean (Animal/HH)
Cattle	Local	36.97	26729	67719	2.53
	Improved	3.45	2494	5209	2.09
Buffalo	Local	34.66	25059	50591	2.02
	Improved	3.10	2241	4072	1.82
Goat	Local	64.29	46487	186667	4.02
	Improved	2.44	1767	10823	6.13
Sheep	Local	1.83	1325	12148	9.17
Pig	Local	8.55	6184	10823	1.75
	Improved	0.92	663	5080	7.67
Others	Local	11.13	8048	16979	2.11
	Improved	0.31	221	66261	300.00
Total		**n=72307**			

Source: Annex Table 57

(Note: Total of the percentage will not match with 100 as it is multiple answers)

3.12 Livestock Housing and Feeding

Regarding the livestock housing and feeding 82.36 percent of the HH have reared their livestock in the shed separately; it was followed by in the residential house (16.42%) and both type (1.22%).

Table 2.20: Place of housing of livestock

Place of housing livestock	HH	
	No.	%
In the shed separately	59550	82.36
In the residential house	11871	16.42
Both	884	1.22
Total	72305	100.00

Source: Annex Table 58

3.13 Milk and Milk Products

Among those HH who have raised livestock, only 15.33 percent have reported that they sell milk and milk products. The amount of milk sold per annum was found to be 1968.77 litres per household.

Table 2.21: Milk and milk products production and sale

Response	HH		Average milk sold/year (litre)
	No.	%	
Yes	11081	15.33	1968.77
No	61225	84.67	-
Total	**72306**	**100.00**	

Source: Annex Table 59 and 60

Large percentage (42.63%) of the HH sold their milk at home followed by 25.90 percent in collection center and 13.94% percent HH sold milk at village.

Table 2.22: HH selling milk at different places

Different Place to sell Milk	HH	
	No.	%
Home	3377	42.63
Collection center	2052	25.90
Village	1104	13.94

Neighbor	695	8.77
District headquarter	0	0.00
Hotel	695	8.77
Others	0	0.00
Total	**7923**	**100.00**

Source: Annex Table 61

3.14 Feeds and feeding

Regarding the type of feeding for the livestock, stall feeding was practiced by 30.08 percent household while feeding in pasture land was reported by 27.15 percent. Stall feeding as well as feeding in pasture land both was reported by 42.77 percent households.

Table 2.23: HH with different type of feeding

Type of feeding	HH	
	No.	%
Stall feeding	21746	30.08
Feeding in pasture land	19632	27.15
Both	30927	42.77
Total	**72305**	**100.00**

Source: Annex Table 62

Regarding the type of feeds given to the livestock, fodder/straw also constituted major portion of livestock feed as it was fed by 71.43 percent of households followed by 43.28 percent who fed green grasses and 39.09% of HHs feed concentrates to their livestock.

Table 2.24: Livestock feeds and feeding types

Types of Feeds	HH	
	No.	(%)
Fodder/straw	31717	71.43
Green Grasses	19220	43.28
Forage	2462	5.54
Concentrates	17356	39.09
Mixed	6216	14.00
Other	2052	4.62
Total	**44403**	**100.00**

Source: Annex Table 63

3.14 Poultry

Poultry was raised by 29.56 percent of the households in the district.

Table 2.25: Households raising poultry

Rearing of poultry	HH	
	No.	%
Yes	27993	29.56
No	66700	70.44
Total	**94693**	**100.00**

Source: Annex Table 64

Of the total birds, local birds were raised by 11.16 to 65.39 percent of household and only 8.12 percent of households raised improved breeds of poultry. Improved breeds were being raised only in case of poultry. Those who have raised poultry in the farm, the average number of improved boiler per farm is found to be at 349.07. On the other hand, the average number of local cock and local hen is found to be 20.81 and

31.91 respectively. Similarly, the average number of ducks per HH was found to be 2.92 for local cock and 1.71 for local hen and around 10 and 15 in case of pigeon

Table 2.26: Average number of improved and local poultry breed reared

	Nos of HHs	HH%	No. of birds	Mean
Poultry				
Local Chick	16537	59.08	923215	55.83
Local Cock	12686	45.32	264019	20.81
Local Hen	18304	65.39	584128	31.91
Local dry	3124	11.16	17939	5.74
Improved Broiler	948	3.39	330824	349.07
Improved Layer	1325	4.73	6405	4.83
Duck		0.00		
Local Chick	1610	5.75	6943	4.31
Local Cock	2494	8.91	7293	2.92
Local Hen	3409	12.18	5843	1.71
Local Dry	221	0.79	442	2.00
Pigeon		0.00		
Local Chick		0.00		
Local Cock	221	0.79	2209	10.00
Local Hen	221	0.79	3313	15.00
Total	**n=27993**			

Source: Annex Table 66

3.16 Fishery

It was surprising that though the nature of the district is plains terai, fishery is not found to be one of the familiar components of agriculture, the share of households in this field is found to be 663 households with average area of 3.5 ha of pond area. Average quantity of fish sold was accounted 60 kg per respondent household in the district

Table2.27: Frequency of HH involved in fisheries, pond area and amount of fish sold

HH (No.)	Number of pond/HH	Pond area/pond (ha)	Quantity of Fish Sold (Kg)
663	1	3.5	60

Source: Annex Table 67

3.17 Forest

As regards to the HH involving in forest land, a total of 20007 HH (70.60%) of the HH involving in community forest with the average holding 158.04 ha /HH. Similarly, households involving in compact forest, scatter forest and other forest area are 15.26, 7.91 and 5.46 percent with the average holding 16.39, 1.57 and 3.57 ha /HH.

Table2.28: Frequency and percentage of HH having different forest area

Different forest area	No of HHs	% of HHs	Total area (ropani)	Mean
Compact Forest	4325	15.26	70899	16.39
Scatter Forest	2241	7.91	3533.92	1.57
NTFP Area	221	0.78	220.87	1.00
Community Forestry	20007	70.60	3161997.97	158.04
Other Forest Area	1546	5.46	5521.75	3.57
Total	**n=28340**			

Source: Annex Table 68

CHAPTER IV: CLIMATE CHANGE, AGRO-ADVISORY & AGRO-MET ADVISORY

One of the major components of BRCH project is to provide timely and proper use of weather forecasts, agro-advisory and agro-met advisory operations in order to increase production and productivity of commodities through proper use of introduced agricultural management information system. By the impact of climate change, environment relating to eco-systems become more vulnerable to natural hazards, which need to be adjusted in existing practices, processes or structures in order to counter potential future disasters. Through the warnings and advisory services, it is expected that BRCH project might benefit the people residing in the study districts and climate-vulnerable communities in particular.

4.1 Climatic Hazards, their Occurrence and Support

The survey result about the experience on climate change by the community revealed that the HH experiencing climate change was during the last one year is reported by 59.83 percent of the HH out of 94692 households. In case of climatic hazards, 93.04 percent of the HH who have experienced climate change reported extreme high temperature which is followed by experience on *drought* (85.79%), *extreme cold* (68.11%), *flood* (63.10%), *extreme frost* (51.71%) and *hail storm* (39.97%).

Table 3.1: Experience on different kinds of climatic hazards (extreme events) during last one year

Experiencing climate change	HH	
	No.	%
Climate change	56658	59.83
Experiencing Climatic Hazards		
Hail Storm	22473	39.97
Extreme high temperature	52302	93.04
Extreme cold	38291	68.11
Extreme Frost	29071	51.71
Floods	35476	63.10
Drought	48230	85.79
Others	1325	2.36
Total	**56218**	**100.00**

Source: Annex Table 69 and 70
(Note: Total of the percentage will not match with 100 as it is multiple answers)

At the time of occurrence of hazards, it is natural and obvious to seek support from the government as well as from the NGOs/INGO. In this regard, out of 44632 households who got support, 87.41percent reporting family support as main support followed by their own saving 67.68%. Either Support from friend/relative or their assets was reported by 20.72% and 11.60 percent of the households.

Table 3.2: Households reporting support from different agencies during climatic hazards

Agencies	HH	
	No.	%
Government support	1136	2.55
Family support	39014	87.41
INGO	1357	3.04

Saving	30207	67.68
Asset	5176	11.60
Friend/relative	9248	20.72
Others	883	1.98
Total	**44632**	**100.00**

Source: Annex Table 71

At the time of occurrence of hazards, it is the responsibility of the people to protect their life and their goods, agricultural crops, livestock etc. provided that if the people have knowledge and experience about the reduction of hazard due to climate change. In this regards, 96.92% of household reported that they protect their lives followed by protect household goods (85.04%), protect livestock (66.64%) and protect agriculture (64.96%).

Table 3.3: Households taking measures to mitigate climatic hazards

Measures	HH	
	No.	%
Protect lives	43748	96.92
Protect household goods	38383	85.04
Protect agriculture	29320	64.96
Protect livestock	30079	66.64
Protect others	1546	3.43
Total	**45138**	**100.00**

Source: Annex Table 72

(Note: Total of the percentage will not match with 100 as it is multiple answers)

4.2 Experience on different types Climatic Extremes in different Seasons

During last 10-15 years, 74.57% of the household reported experiencing change in climate.

Table 3.4: Households experiencing climate change in last 10 - 15 years

Response	**HH**	
	No.	**%**
Yes	70609	74.57
No	24078	25.43
Total	**94687**	**100.00**

Source: Annex Table 73

Among HH who had experienced change in climate, 30.13% of the HH reported low rainfall during rainy season while 74.16% reported high rainfall. Frequent floods and droughts were reported by 49.93% and 40.01% HH and more frost was reported by 4.78% HH in rainy season. Increased temperature was reported by 45.51, 72.82 and 8.81% HH during dry, rainy and winter season. Frequent hail storm was reported by 19.85% of the HH during rainy season. (Table 3.5).

Table 3.5: HH experiencing different types of climatic extremes (%)

Types of Climatic Extreme	**Dry Season (Jan-April)**		**Rainy Season (May-August)**		**Winter Season (September-December)**		**Total**	
	No.	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
Less overall rainfall	53346	75.55	21276	30.13	29801	42.21	64297	91.06
More overall rainfall	6469	9.16	52366	74.16	9534	13.50	55302	78.32
More frequent drought	52555	74.43	28251	40.01	15120	21.41	61804	87.53
More frequent flood	1799	2.55	35255	49.93	1988	2.82	36138	51.18
Strong wind	38130	54.00	22380	31.70	1799	2.55	43937	62.23
More cold spells or foggy days	18405	26.07	3377	4.78	31532	44.66	45515	64.46
Higher temperature	32135	45.51	51419	72.82	6221	8.81	59310	84.00

Frequent hailstorm	7574	10.73	14015	19.85	4482	6.35	23420	33.17
Lower ground water table	27524	38.98	12566	17.80	4638	6.57	32512	46.05
Total	**n=70609**							

Source: Annex Table 74

(Note: Total of the percentage will not match with 100 as it is multiple answers)

4.3 Early Warning Messages

Though there are some services of early warning messages through various organizations, these messages were not being implemented by the community as they have less capacity to cope with disaster. They are more dependent on natural on natural resources for their livelihoods. In this regards, the survey result shows that the awareness on early warning message about climate/weather hazards were reported by 22.23 percentof the HH in the district.

Table 3.6: Households reporting receipt of early warning messages

Response	HH	
	No.	%
Yes	21055	22.23
No	73639	77.77
Total	**94694**	**100.00**

Source: Annex Table 75

Among various sources of early warning messages (such as telephone, Radio/TV, siren, Bulletin/Newspaper), Majority of HHs (84.10%) have reported about the early warning was received from Radio/TV followed by siren (22.26%) and bulletin/newspaper (17.58%).

Table 3.7: Households reporting receipt of early warning from different sources

Sources	HH	
	No.	%
Telephone	3474	16.67
Radio/TV	17521	84.10
Siren	4638	22.26
Colorful flag	0	0.00
Hand mike	0	0.00
Bulletin/newspaper	3662	17.58
Others	663	3.18
Total	**20834**	**100.00**

Source: Annex Table 76

4.3.1 Perception about the Need of Types of Communication Media for Early Warning

Communication plays an important role for the development of any region or place. When asked about the early warning system from various communication media, 82.35 percent of HH preferred FM Radio/TV, SMS on mobile (70.90%), digital display board (52.87%), siren (50.89%) and telephone (46.60%) as medium for delivery of early information. Internet is preferred by 17.75percent of HHs.

Table 3.8: Households (%) selecting suitable EWS and agricultural information medium

Medium for delivery of Early information	HH	
	No.	%
Telephone	42263	46.60
SMS on mobile	64297	70.90
Siren	46146	50.89
FM Radio/TV	74682	82.35
Newspaper	38291	42.22
Digital display board	47949	52.87

Internet	16099	17.75
Others	663	0.73
Total	**90685**	**100.00**

Source: Annex Table 77
(Note: Total of the percentage will not match with 100 as it is multiple answers)

When asked about the location for fixing the digital display board, DADO/DLSO was given the highest priority for placing the digital display board by 42.17 percent of the households. Second priority was given agro vet (34.94%) followed by ASC/LSC (10.83%).

Table 3.9: Priority of location suitable for Digital Display Board

Location	HH	
	No.	%
DADO/DLSO offices	37114	42.17
Agriculture/Livestock Sub Center	9535	10.83
VDC/DDC offices	5688	6.46
Markets	4924	5.60
Agro Vet	30745	34.94
Other place	0	0.00
Total	**88006**	**100.00**

Source: Annex Table 78

4.3.2 Accessibility to Agricultural Advice and Sources

There are various sources of agro and agro-met advisory service providers in the district such as District Agriculture Development Office (DADO), Livestock Service Centre (LSC), Agricultural Research Farm, NGOs/INGOs, and Agro Vets etc. in the district. However, the survey result shows that only 6.8 percent of the HH are found to have received agro advisory service during the last 12 months (Annex Table 79).

Sources of agro advisories

Among those HH who have received advisory were only on crop production and livestock/fishery farming. None of the HH has reported advisory on vegetable/fruits, plant protection and marketing etc.

4.3.3 Need for Agro Advisory

At present thought overwhelming majority of the respondents are found to have not taken advisory, they were interested to have advice from the service providers. In this regards, 87.64 percent of the HH have preferred mobile service, 62.14 percent digital display board at district office, 56.90 percent toll free service, 54.06 percent telephone and 47.56 percent newspaper/bulletin. Few HH (21.95%) have preferred internet service.

Table 3.10: HH preferring advisory services by type

Types of advisory	HH	
	No.	%
Mobile service	77016	87.64
Telephone	47503	54.06
Newspaper/Bulletin	41793	47.56
Toll free	49997	56.90
Internet service	19288	21.95
Digital display board	54607	62.14
Others	2715	3.09

Total	**87874**	**100.00**

Source: Annex Table 81

4.3.4 Communication and Media for Agricultural Program

For the development of any region or place communication plays an important role. There are number of communication media such as FM radio, television, newspaper etc., through which agriculture programmes are being broadcasted in order to make farmers aware of adopting farming system and disseminating information on pre-warning of climate and weather. However, from the survey it is observed that the percentage of HH listening agriculture programme on radio is found to be quite low at only 17.07 percent of the households regularly listened. Only 18.73 percent of the household reported watching agricultural program in television and 21 percent of theHH read newspapers and magazines. This shows that communication media are not effectively penetrating to general mass of people (annex Tables 82, 83 and 84)

Annex1

Average Maximum and Minimum Temperature and Rainfall (2000-2010)

Month	Maximum Temperature (^{0}C)	Minimum Temperature (^{0}C)	Rainfall (mm)	No. of Rainy days
January	17.9	6.00	14.2	2
February	20.9	8.60	22.9	3
March	25.0	11.0	36.9	6
April	26.9	13.2	139.2	12
May	27.3	14.8	181.7	17
June	28.0	17.0	251.3	22
July	27.3	18.6	302.6	26
August	28.0	17.6	301.7	24
September	26.8	16.3	176.8	19
October	25.6	12.9	66.5	8
November	22.4	8.80	5.60	1
December	19.5	6.40	5.40	0