

**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

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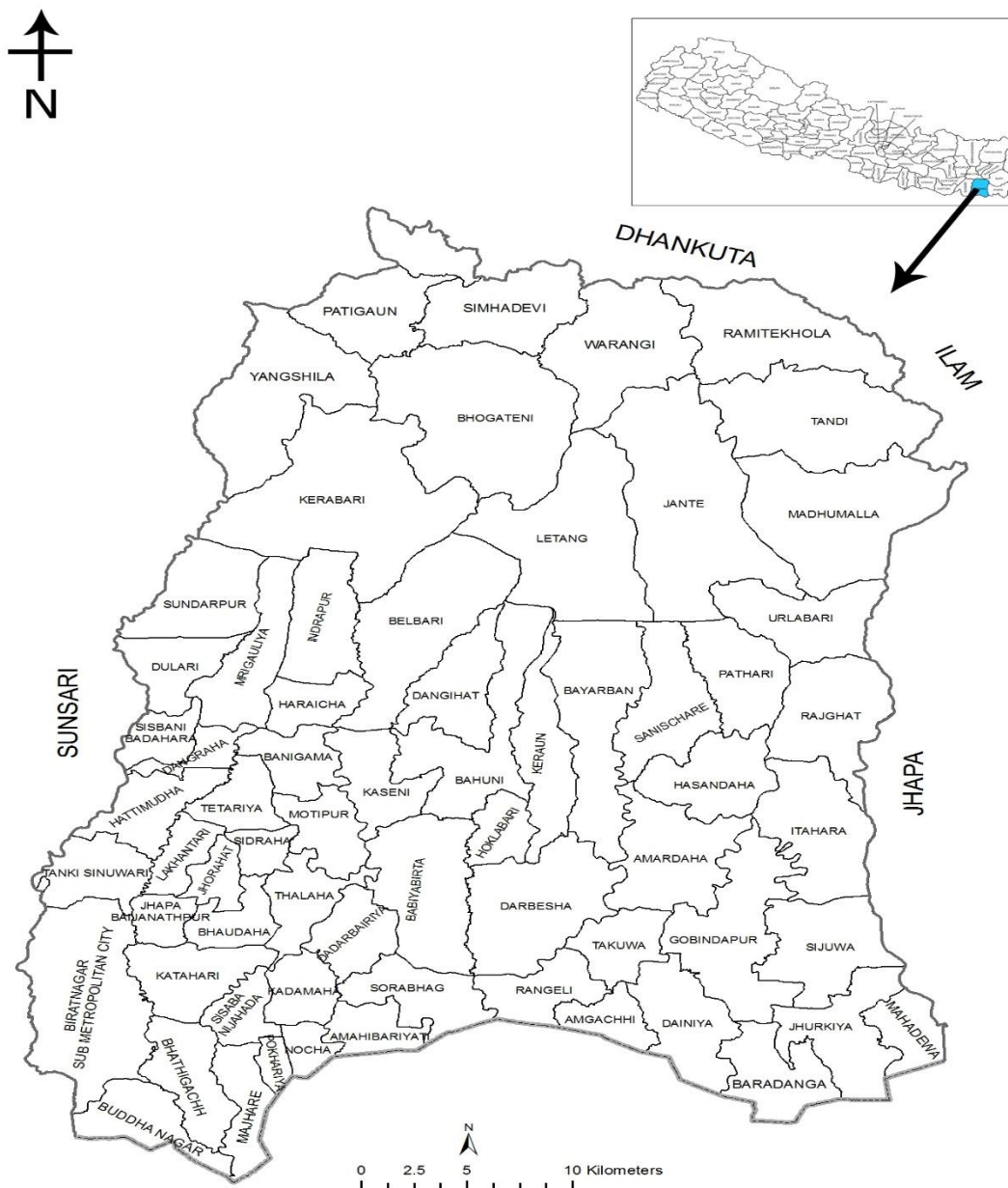
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## CHAPTER I:INTRODUCTION

### 1.1 General Information

Morang, a Terai district, is one of the 25 pilot districts of Building Resilience to Climate Related Hazards Project (BRCH), situated in Koshi zone of Eastern Development Region (EDR). Geographically, the district is located in the latitude of 26° 06' to 26° 28' N and the longitude of 87°16' to 87°40' E (Figure 1). The head-quarter of the district is Biratnagar sub-metropolitan city. It borders with Jhapa in the east, Sunsari district in the west, Dhankuta and Ilam districts in the north and Bihar state of India in the south.



**Figure 1: Location Map of Morang District**

The topography of the district is almost same as other Terai districts. Most part of Morang lies on flat Terai region among which 80.9% of its area is under lower tropical region having altitude below 1000

feet. Similarly 11.5% of its area lies in between 1000 to 3000 ft. called Upper Tropical Region or Siwalik range and about 7.4% areas lies in subtropical range.

The variation of altitude is in between 60 meters to 2410 meter. The total area of the district is 1,855 sq. km. The population of the district consists of 9,65, 370 with 4,66,712 male and 498,658 female with 2, 13,997HH as of 2011 census. The share of population is only 3.64% of the total population of the country with a density of 520 persons/sq.km, which is more compared to national population density of 180 persons/sq. km. as of 2011 census.

## 1.2 Land Utilization

The total area of the district is 1,85,500 ha. with total cultivable land area of 1, 16,959 ha, which consisted of 1, 40, 331 ha cultivated land area (DADO, 2014). The district has irrigated land 81,829 ha out of which year round irrigation is in 31,700 ha, and seasonal irrigated area is 50, 129ha.

## 1.3 Climate and Rainfall

As the altitude of the district varies, climate of the district can be found different in different altitudes, the classification of which is given as under:

**Lower-tropical:** Areas located at altitudes of below 300 msl consisted of this type of climate, where summer is hot and winter is cool. Plenty of agricultural land is available in this area. This covers 80.9% of the districts area..

**Upper tropical:** Areas located at altitudes of between 300 to 1000 msl consisted of this type of climate, where summer is also hot and winter is cool. Plenty of agricultural land is available in this area also. Besides agricultural land This area has forest land it also consists of small hills of Siwalik range. This covers 11.5% of the districts area..

**Sub-tropical:** This type of climate is found at altitude of 1000 to 2000 msl where summer is warm and winter is cold. Only 7.4% of the district lies under this zone.

**Temperate climate:** This type of climate is found at altitudes of 2000 to 3000 msl, where frost is common and sometimes snowfall occurs when the temperature is very low in the winter. Only 0.2% of the district lies under this zone.

As Morang lies in tropical region it is mostly affected by monsoon effect. Average maximum temperature of 33.8C<sup>0</sup> occurs during May and average minimum temperature of 9.2 degree Celsius occurs during winter month of January. Minimum rainfall occurs in winter season and 80% of total rainfall occurs during April to September. Average annual rain fall varies in between 19000 mm to 2200 mm. Climatic records of Biratnagar is presented in Annex 1

## CHAPTER II: DEMOGRAPHIC AND SOCIO-ECONOMIC CHARACTERISTICS

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.

**Table 1.1: Summary statistics of demographic and other household characteristics**

Description	CBS, 2011	Base line survey 2015
Sex ratio (number of males per 100 females)	94.6	113.16
Dependency ratio		
Household (HH) size	4.51	5.29
Percent of female headed households	25.37	8.35
HH (%) who own their housing unit	86.76	
HH (%) with piped drinking water	18.92	
HH (%) with access to electricity	75.79	
HH (%) with access to Telephone/Mobile	71.02	
HH (%) with toilet	73.38	
HH (%) using firewood for cooking	44.90	
Literacy rate	70.9	

### 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 53.09 percent is higher than 46.91 percent of female population giving sex ratio of 113.16 in the district. About 17.82 percent of population were under 15 years and 9.52 percent were of 60 years or more old. Thus majority of population (72.34%) were from age group 15-59 years (Table 1.2). The survey data revealed that the overall dependency ratio is 37.63 percent. Regarding the HH size, the average HH size of the district is found to be 5.29 compared to 4.51 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	22245	1.96	23372	2.06	45617	4.03%
5-9 Years	36031	3.18	35846	3.17	71877	6.35%
10-14 Years	41578	3.67	42705	3.77	84283	7.44%
15-19 Years	57281	5.06	61972	5.47	119253	10.53%
20-24 Years	78306	6.92	61114	5.40	139420	12.31%
25-29 Years	67320	5.95	66641	5.89	133961	11.83%
30-34 Years	52201	4.61	48166	4.25	100367	8.86%
35-39 Years	41849	3.70	27478	2.43	69327	6.12%
40-44 Years	40585	3.58	39750	3.51	80335	7.10%
45-49 Years	37609	3.32	36954	3.26	74563	6.59%
50-54 Years	34270	3.03	27345	2.42	61615	5.44%
55-59 Years	25358	2.24	18476	1.63	43834	3.87%
60-64 Years	23645	2.09	19109	1.69	42754	3.78%
65+ Years	42820	3.78	22245	1.96	65065	5.75%
<b>Total</b>	<b>601098</b>	<b>53.09</b>	<b>531173</b>	<b>46.91</b>	<b>1132271</b>	<b>100.00%</b>

Source: Annex Table 1

## 2.2 Household head and members

Son/daughter constituted largest percentage (34.71%) of household members followed by household heads which constituted 18.89 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				Total	
	Male		Female		Total	
	No.	%	No.	%	No.	%
Head	196005	17.31	17865	1.58	213870	18.89
Husband/wife	12476	1.10	179715	15.87	192191	16.97
Son/daughter	259171	22.89	133891	11.83	393062	34.71
Grand children	57710	5.10	59063	5.22	116773	10.31
Son/daughter in law	58116	5.13	120671	10.66	178787	15.79
Daughter/son in law	496	0.04	992	0.09	1488	0.13
Parent	10964	0.97	10333	0.91	21297	1.88
Father/mother in law	0	0.00	1984	0.18	1984	0.18
Brother/sister in law	4669	0.41	4601	0.41	9270	0.82
Household widow		0.00		0.00		0.00
Others	1488	0.13	2052	0.18	3540	0.31
<b>Total</b>	<b>601095</b>	<b>53.09</b>	<b>531167</b>	<b>46.91</b>	<b>1132262</b>	<b>100.00</b>

Source: Annex Table 2

From the Table 1.3, it is seen that out of 18.89 percent household heads, female formed 1.58 percent of heads in comparison to 17.71 percent of male members who were household heads thus giving overall female household head percentage as 8.35 percent.

## 2.3 Marital Status of head of households

A total of 67.12 percent of HH members were married. Widow members of the household constituted 1.66 percent of the population. A total of 34.33 percent of population were married male whereas married female population accounted for 32.79 percent of total population.

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

Marital Status	Gender				Total	
	Male		Female		Total	
	Number	%	Number	%	Number	%
Married	348328	34.33	332785	32.79	681113	67.12
Divorced	496	0.05	1556	0.15	2052	0.20
Separate	1060	0.10	2121	0.21	3181	0.31
Widow/widower	8776	0.86	8075	0.80	16851	1.66
Unmarried	184160	18.15	127418	12.56	311578	30.70
<b>Total</b>	<b>542820</b>	<b>53.49</b>	<b>471955</b>	<b>46.51</b>	<b>1014775</b>	<b>100.00</b>

Source: Annex Table 3

Male gender had higher percentage of widow (0.86%) than female gender (0.8%). Unmarried male constituted more (18.15%) of total population than unmarried female (12.56%).

## 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 95.64 percent compared to 70.9 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 26.15 percent, is followed by primary level (13.59%), lower secondary (13.25%), secondary (12.94%), inter/equivalent (10.9%) and SLC/equivalent (10.8%). People having graduated and above graduate level are still found to have quite low at 5.96 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	13872	1.28	33502	3.08	47374	4.36
Can read and write	110434	10.16	173670	15.98	284104	26.15
Beginners	14867	1.37	7511	0.69	22378	2.06
Primary (1-5)	86362	7.95	61270	5.64	147632	13.59
L. Secondary (6-8)	89407	8.23	54527	5.02	143934	13.25
Secondary (9-10)	76840	7.07	63800	5.87	140640	12.94
SLC/Equivalent	74019	6.81	43290	3.98	117309	10.80
Inter/Equivalent	71559	6.59	46922	4.32	118481	10.90
Grad/Equivalent	29373	2.70	13602	1.25	42975	3.95
PG/Equi/above	12112	1.11	9701	0.89	21813	2.01
<b>Total</b>	<b>578845</b>	<b>53.27</b>	<b>507795</b>	<b>46.73</b>	<b>1086640</b>	<b>100.00</b>

Source: Annex Table 4

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

Currently 23.06 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 11.8 percent and 11.26 percent of their population respectively.

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

Going to School	Gender				Total	
	Male		Female			
	No.	%	No.	%	No.	%
Yes	128029	11.80	122183	11.26	250212	23.06
No	450328	41.50	384628	35.44	834956	76.94
<b>Total</b>	<b>578357</b>	<b>53.30</b>	<b>506811</b>	<b>46.70</b>	<b>1085168</b>	<b>100.00</b>

As regards to the accessibility to educational institutions in terms of time, 66.33 percent of the respondents have reported that distance to reach is less than 1 km, whereas 21.74 percent reported distance of 1-5 km, 5.98 percent reported distance of 5-10 km and 5.95 percent of more than 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	83608	33.41	82366	32.92	165974	66.33
1-5 km	28967	11.58	25426	10.16	54393	21.74
5-10 km	7511	3.00	7446	2.98	14957	5.98
Greater than 10 km	7941	3.17	6947	2.78	14888	5.95
<b>Total</b>	<b>128027</b>	<b>51.17</b>	<b>122185</b>	<b>48.83</b>	<b>250212</b>	<b>100.00</b>

Source: Annex Table 6

Accessibility to educational institution by gender shows that that 89.13 percent of the respondents have reported that institutions can be reached within less than 1 hour followed by 1-2 hours (6.91%) and more than 2 hours (3.97%).

**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	114425	45.73	108580	43.40	223005	89.13
1-2 hours	8639	3.45	8639	3.45	17278	6.91
More than 2 hours	4963	1.98	4963	1.98	9926	3.97
<b>Total</b>	<b>128027</b>	<b>51.17</b>	<b>122182</b>	<b>48.83</b>	<b>250209</b>	<b>100.00</b>

Source: Annex Table 7

Regarding mode of transport, 47.77 percent of the population reported travelling on foot for educational institution, 27.55 percent using bicycle and 20.07 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	58838	45.96	60685	24.25	119523	47.77
Bus	24929	19.47	25288	10.11	50217	20.07
Bicycle	38172	29.82	30750	12.29	68922	27.55
Foot and bus	2977	2.33	3969	1.59	6946	2.78
Other	3113	2.43	1489	0.60	4602	1.84
<b>Total</b>	<b>128029</b>	<b>100.00</b>	<b>122181</b>	<b>48.83</b>	<b>250210</b>	<b>100.00</b>

Source: Annex Table 8

## 2.6 Occupation

As revealed from the table1.10, among various types of occupations adopted by the people, 37.2 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 2.67 percent of the population. Student as their occupation accounting for 17.67 percent is followed by household work accounting for 15.86 percent. About 10.6 percent of the population was engaged in non-agricultural salaried work, is followed by external jobs in abroad accounting for 7.65 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 1.72 and 0.7 percent in comparison to 8.89 and 6.94 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	188152	18.54	189324	18.66	377476	37.20
Salaried/wage agriculture	20192	1.99	6949	0.68	27141	2.67
Non agriculture salary	90174	8.89	17416	1.72	107590	10.60
Own enterprises	19244	1.90	4467	0.44	23711	2.34
Abroad external job	70430	6.94	7150	0.70	77580	7.65
Household work	23984	2.36	136940	13.49	160924	15.86
Student	91503	9.02	87825	8.65	179328	17.67
No work	23846	2.35	14235	1.40	38081	3.75
Other	15296	1.51	7646	0.75	22942	2.26
<b>Total</b>	<b>542821</b>	<b>53.49</b>	<b>471952</b>	<b>46.51</b>	<b>1014773</b>	<b>100.00</b>

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 48.23 percent of the households, followed by 6.17 percent for education/training purpose and 1.86% for easier lifestyle.

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

Reason for Migration	HH	
	No	%
Family reason	1489	0.78
Education/training	11754	6.17
Natural disaster	993	0.52
Looking for work	91907	48.23
Easier lifestyle	3542	1.86
No migration	79885	41.92
Other reason	993	0.52
<b>Total</b>	<b>190562</b>	<b>100.00</b>

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, 7.03 percent of the population are associated with saving and credit cooperative followed by agricultural cooperatives (4.67%). Association with the institutions such as, vegetable group, water user group, agriculture marketing group is almost negligible. Association with such organizations is slightly visible in rural area than in urban area. However, other than the above mentioned institutions, their associations in category 'others' are found to be very high at 86.66 percent.

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

Types of organizations	Gender				Total	
	Male		Female			
	No.	%	No.	%	No.	%
Farmers Field School	5028	0.50	1985	0.20	7013	0.69
Vegetable	496	0.05	992	0.10	1488	0.15
Water Users Group	1488	0.15	0	0.00	1488	0.15
Commercial Crop Production	564	0.06	0	0.00	564	0.06
Saving credit co-operative	16422	1.62	54958	5.42	71380	7.03
Agricultural co-op group	25943	2.56	21409	2.11	47352	4.67
Agriculture marketing	2548	0.25	992	0.10	3540	0.35
Seed production		0.00		0.00		0.00
Other	1556	0.15	992	0.10	2548	0.25

Not in Group	488770	48.17	390630	38.49	879400	86.66
<b>Total</b>	<b>542815</b>	<b>53.49</b>	<b>471958</b>	<b>46.51</b>	<b>1014773</b>	<b>100.00</b>

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 36.44 percent of the total population, followed by Madhesi (29.12%), Brahmin/Chhetri (26.24%), Others (5.25%) and Dalit (2.95%).

**Table 1.13:: Distribution of population by ethnicity**

Ethnicity	Gender				Total	
	Male		Female			
	No.	%	No.	%	No.	%
Adibasi/Janajati	216709	19.14	195888	17.30	412597	36.44
Brahman/Chhetri	149206	13.18	147940	13.07	297146	26.24
Dalit	18817	1.66	14575	1.29	33392	2.95
Madhesi	181172	16.00	148546	13.12	329718	29.12
Others	35194	3.11	24229	2.14	59423	5.25
<b>Total</b>	<b>601098</b>	<b>53.09</b>	<b>531178</b>	<b>46.91</b>	<b>1132276</b>	<b>100.00</b>

Source: Annex Table 11

## 2.10 Housing Ownership

Regarding the ownership of the houses, almost all the HH (99.27%) 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	212317	99.27
Rented house	496	0.23
Relative's house	564	0.26
Land owner's house (included in rented land)	496	0.23
Institutional house	0	0.00
<b>Total</b>	<b>213873</b>	<b>100.00</b>

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 (69.74%) of the HH were found to have lived in Semi-pakki houses, 15.43 percent of the respondents are found to have lived in Kachi/Thatch roofed houses and 13.67 percent in concrete roof/Pakki houses.

**Table 1.152: Distribution of houses by types of houses**

Type of residential house	HH	
	No.	%
Concrete roof/pakki/cemented	29237	13.67
Semi-pakki (tin/tile/slate roof)	149145	69.74

Kacchi- thatched roof	33006	15.43
Others	2480	1.16
<b>Total</b>	<b>213868</b>	<b>100.00</b>

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 30.71 percent of household items followed by fan/heater (19.8%), cycles (18.28%), , TV and radio/CD player (11.24%) and assets including jewellery (7.73%). 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 (28.86%) portion of the net value of the all the assets owned by the households followed by Tractor/power tiller (25.27%), motorcycle/scooter (23.75%), telephone/mobile (7.36%) and TV (6.66%) of the net value of the assets. Insignificant proportion of the net value was represented by the assets like refrigerators, washing machine, bus/truck, 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	73612	4.73	79677964	0.34
Cycles	284372	18.28	639377025	2.73
Motorcycle/scooter	75104	4.83	5554249750	23.75
Car/jeep	0	0.00	0	0.00
Bus/truck	0	0.00	0	0.00
Telephone/mobile	477869	30.71	1721409819	7.36
Washing machine	0	0.00	0	0.00
Refrigerator	496	0.03	7444350	0.03
Sewing machine	20191	1.30	95355694	0.41
Fan/heater	307994	19.80	378550284	1.62
TV	174909	11.24	1556889192	6.66
Assets including Jewelries	120199	7.73	6750466136	28.86
Tractor/power tiller	11957	0.77	5909603780	25.27
Thresher/pump set/sprayers	496.29	0.03	595548	0.00
Mill/Ghatta/turbine	2053	0.13	71830180	0.31
Others	6655	0.43	621864500	2.66
<b>Total</b>	<b>1555909</b>	<b>100.00</b>	<b>23387314223</b>	<b>100.00</b>

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, majority of the HH (65.57 %) have reported they have food sufficiency for 12 or more months. A total of 19.57% of the HH have reported that food is sufficient for 9 to 12 months, indicating that majority of the HH have food sufficiency and district have surplus food.

**Table 1.173: Food sufficiency of the HH by duration**

Food sufficiency level	HH	
	No.	%
Less than 3 months	4037	1.89
3 to less than 6 months	15994	7.48
6 to less than 9 months	11753	5.50
9 to less than 12 months	41846	19.57
12 months or surplus	140233	65.57
<b>Total</b>	<b>213863</b>	<b>100.00</b>

Source: Annex Table 16

### 2.13 Source of Energy

As regards to the source of energy for lighting, almost all the households (93.61%) have electricity, only very few households (4.01%) 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 58.54 % of the total HH. About 19.33%, 10.44 and 9.71 % of the HH have used cow dung cake, biogas and gas cylinder 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	200202	93.61
	Biogas	3113	1.46
	Solar	1986	0.93
	Kerosene	8571	4.01
	Other		0.00
	<b>Total</b>	<b>213872</b>	<b>100.00</b>
Cooking fuel	Timber/ firewood	125208	58.54
	Cow dung cake	41332	19.33
	Straw/ dry grass/ eaves/rubbish	4105	1.92
	Cylinder gas	20890	9.77
	Biogas	22333	10.44
	Kerosene		0.00
	Other		0.00
	<b>Total</b>	<b>213868</b>	<b>100.00</b>

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 85.42% of the HH followed by piped water (11.93%). 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	25513	11.93
Covered well	2684	1.25
Hand pump/tube-well	182696	85.42
Open well	1984	0.93
Spring water	993	0.46
River		0.00
Other		0.00
<b>Total</b>	<b>213870</b>	<b>100.00</b>

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. Almost all HH (86.74%) have access to toilet in their HH indicating wide spread effect of recent

campaigns on making districts open defecation free. Majority (54.26%) of the HH have reported that they have toilet without flush followed by toilet with flush (connected to safety tank) 29.4% . Very insignificant percentage (2.38%) of people have toilet with flush connected to sewer and 13.26% 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)	5098	2.38
Toilet with flush (connected to safety tank)	62875	29.40
Toilet without flush	116048	54.26
Public toilet	1489	0.70
No toilet	28356	13.26
<b>Total</b>	<b>213866</b>	<b>100.00</b>

Source: Annex Table 20

## 2.16 Households Consulting Health Institutions

There are various kinds of health institutions prevailing in the district. Among all, government health post/centers cater substantial percentage of households (35.23%), which is followed by private hospitals (26.53%) and government's district hospital (23.29%). Other privates and Private pharmacy/clinic providing services for 6.96 and 4.67% of HHs. Ayurveda and mobile centers 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	75349	35.23
Government district hospital	49813	23.29
Government mobile clinic	2053	0.96
Government Ayurveda center		0.00
Government other institution	4535	2.12
Private hospital	56738	26.53
Private pharmacy/clinic	9993	4.67
Private health worker's home	496	0.23
Private others	14889	6.96
<b>Total</b>	<b>213866</b>	<b>100.00</b>

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 Input cost for agriculture/livestock/other enterprises constituted highest part of expenditure with 21.47% followed by 19.77% expenses on education, 13.27% in apparel and personal items and 11.47% in health.

**Table 1.22: Expenditure distribution of HH by different items**

Items of expenditure	HH (No).	Total expenditure		Average expenditure/HH (Rs)
		Rs	%	
Food	39503	747779947	2.82	18929
Fuel	80539	669738482	2.52	8316

Apparel and personal items	208343	3524676460	13.27	16918
Social and religious activities/donation/charity	189348	1759973358	6.63	9295
Insurances and taxes	66642	701095777	2.64	10520
Repair and maintenance of house, vehicles, equipment	127172	1437939203	5.41	11307
Transportation	190544	1352367479	5.09	7097
Newspaper/communication	168322	1190376455	4.48	7072
Disaster related expenses	56874	294973435	1.11	5186
Input cost for agriculture/livestock/other enterprises	183617	5703354286	21.47	31061
Health	190566	3046204698	11.47	15985
Education	144453	5250765415	19.77	36349
Cash losses	6520	273540875	1.03	41957
Other	10604	608801730	2.29	57411
<b>Total</b>	<b>n= 213873</b>	<b>26561587599</b>	<b>100.00</b>	<b>124193</b>

Source: Annex Table 22

As regards to the income of the HH in the district, remittances was found to be major contributor to total annual income, which accounted for 28.95 percent followed by non-agricultural wage and salary (20.72 %), sale of agricultural product (15.58%) and Milk and milk product sale (13.36 %). Combining the income from different heading as given in the following table the average income is found to Rs.3,45,827 per household.

**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	16785	1019072965	1.38	60715
Non agricultural wages/salary	87783	15324238407	20.72	174569
Sale of agricultural products	142489	11525631387	15.58	80888
Livestock/fisheries sale	111062	3104040097	4.20	27949
Milk and milk product sale	93942	9884388643	13.36	105218
Remittances	66032	21409490370	28.95	324230
Occupational work (tailoring, black smithy, carpentry etc)	14235	4545703950	6.15	319325
Forestry related products sale	0	0	0.00	0
Pension	2978	579170430	0.78	194500
Own enterprise	19966	4207816910	5.69	210750
Others	11393	2363440200	3.20	207441
<b>Total</b>	<b>213873</b>	<b>73962993359</b>	<b>100.00</b>	<b>345827</b>

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.2,21,633 per household showing that the livelihood is not so hard.

## 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 42.94 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	91842	42.94
No	122027	57.06
<b>Total</b>	<b>213869</b>	<b>100.00</b>

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 74.14 percent of the households have reported that there is presence of climate and weather related risks on crops and livestock production.

**Table 1.25: Distribution of HH reporting presence of climatic and weather related risks in agriculture**

Possibility of risks on crop/livestock	HH	
	No.	%
Yes	158553	74.14
No	55316	25.86
<b>Total</b>	<b>213869</b>	<b>100.00</b>

Source: Annex Table 25

Among the households reporting presence of climate and weather related risks, 43.78 percent in wheat to 75 percent in vegetable oversee the risk of diseases and pests. Similarly drought was reported by 21.43 percent to 39.35 percent households as risk on potato and rice respectively. Risk of hail stone on wheat, rice, and maize was reported by 15.1, 10.58, and 4.37 percent of households while risks due to flood on rice and vegetables was reported by 5.92 and 2.03 percent of households respectively.

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

Crop/livestock	HH No and %	Risks in crops and livestock due to climatic hazards						Total
		Disease pest	Drought	Flood	Hail stone	All	Others	
Rice	No of HHs	141047	127083	19109	34180	1060	496	322976
	%	43.67	39.35	5.92	10.58	0.33	0.15	100.00
Wheat	No of HHs	77586	69713	2685	26757	496		177237
	%	43.78	39.33	1.51	15.10	0.28	0.00	100.00
Maize	No of HHs	35801	26303	1060	3046	564	2978	69752
	%	51.33	37.71	1.52	4.37	0.81	4.27	100.00
Mustard	No of HHs	13468	9497		496		1489	24950
	%	53.98	38.07	0.00	1.99	0.00	5.97	100.00
Vegetable	No of HHs	16221	7716	564	3249			27750
	%	58.45	27.80	2.03	11.71	0.00	0.00	100.00
Potato	No of HHs	10422	2978		496			13896
	%	75.00	21.43	0.00	3.57	0.00	0.00	100.00
Cow	No of HHs	11911	993					12904
	%	92.31	7.69	0.00	0.00	0.00	0.00	100.00
Buffalo	No of HHs	4534						4534
	%	100.00	0.00	0.00	0.00	0.00	0.00	100.00
Sheep	No of HHs	496						496
	%	100.00	0.00	0.00	0.00	0.00	0.00	100.00
Goat	No of HHs	8437					169	8606
	%	98.04	0.00	0.00	0.00	0.00	1.96	100.00
Chyangra	No of HHs							0



	%							
Chicken	No of HHs	4963				496		5459
	%	90.91	0.00	0.00	0.00	9.09	0.00	100.00
Duck	No of HHs	507						507
	%	100.00	0.00	0.00	0.00	0.00	0.00	100.00
Other	No of HHs	6295	5234	993		496		13018
	%	48.35	40.21	7.62	0.00	3.81	0.00	100.00
<b>Total</b>	<b>No of HHs</b>	<b>331687</b>	<b>249517</b>	<b>24411</b>	<b>68224</b>	<b>3113</b>	<b>5132</b>	<b>682085</b>
	<b>%</b>	<b>48.63</b>	<b>36.58</b>	<b>3.58</b>	<b>10.00</b>	<b>0.46</b>	<b>0.75</b>	<b>100.00</b>

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 high as 100 percent of the household have reported that buffalo and sheep were more prone to risks due to diseases and pests followed by goat (98.4%), cow (92.31%) and chicken (90.91%) where as ddrought effects were reported by only 7.69 percent in cow.

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 6.49% 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	13877	6.49
No	199996	93.51
<b>Total</b>	<b>213873</b>	<b>100.00</b>

Source: Annex Table 27

Among the household who have knowledge on crop/livestock insurance only 3.8negligible percent of household has insurance their livestock.

## 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, negligible portion 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 48.86% respondents cited lack of information followed by poor insurance service (20.18%) and high premium rate (15.14%) 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	4806	48.86
High premium rate	1489	15.14
No access to the service	496	5.05
Poor insurance service	1985	20.18
Problem in getting back the insured amount	496	5.05
Others	564	5.74
<b>Total</b>	<b>9837</b>	<b>100.00</b>

Source: Annex Table 29

DADOs/DLSOs and ASC/LSCs were reported as major sources of information on agriculture insurance reported by 42.86% and 28.57 of the 3474 household respondents.

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

Source	HH	
	No.	%
Insurance agent		0
DADOs/DLSOs	1489	42.86
Newspaper	496	14.29
TV/Radio	496	14.29
ASCs/LSCs	993	28.57
Leader farmer/Neighbor/Relatives	496	14.29
Other	496	14.29
<b>Total</b>	<b>3474</b>	<b>100.00</b>

Source: Annex Table 32

Out of 12386 households, only 1488 (12.01%) 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	1488	12.01
No	10898	87.99
<b>Total</b>	<b>12386</b>	<b>100.00</b>

Source: Annex Table 33

## CHAPTER III: AGRICULTURE AND AGRICULTURE RELATED PRODUCTION 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 (86%) 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 0.777 ha/HH and overall irrigated land is 0.432 ha/HH with average number of parcel land is 1.69. Very insignificant land were used for temporary graze land, the average area of which is found to be 0.0023 ha. Use of temporary fallow found with average area 0.0172 ha/HH followed by land for permanent crops 0.0084 ha/HH with average number of parcel of 1. Similarly, HH have used smallest area for fishery, and using land for area appropriate for forest were found negligible.

**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	.7772	1.69	.4326
Temporary graze land	.0023	1.00	0.0001
Temporary fallow	.0172	1.22	0.0000
Permanent crops	.0084	1.00	.0000
Permanent graze land	.0014	1.00	.0000
Appropriate for forest	.0055	1.00	.0000
Appropriate for fishery	.0005	0.00	0.0000
<b>Total no of Household: 213870</b>			

Source: Annex Table 35

### 3.3 Source of Irrigation:

Out of 66099 respondents, who have managed to irrigate in their field with different sources of irrigations for temporary crops, majority (57.57%) 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 (40.17%) and natural flow canal (1.5%).

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

Sources of irrigation	Temp. crops		Irrigated agriculture land	
	No.	%	No.	%
Tube well, boring	26555	40.17	-	-
Continuous flow canal	38056	57.57	-	-
Natural flow canal	992	1.50	-	-
Pond/ well	496	0.75	-	-
Mixed		0.00	-	-
Others		0.00	-	-
<b>Total</b>	<b>66099</b>	<b>100.00</b>	<b>-</b>	<b>-</b>

Source: Annex Table 35, 36

### Leased land

Few segment of population (2.12%) have given land to others on lease and the average holding of leased out land is 0.0131 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	4436.77	.0207		
Bari	1146.21	.0054		
<b>Total</b>	<b>5582.98</b>	<b>.0131</b>	<b>4535</b>	<b>2.12</b>

Source: Annex Table 41 and 42

A total of 213868 households (29.98%) 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	64116	29.98
No	149752	70.02
<b>Total</b>	<b>213868</b>	<b>100.00</b>

Source: Annex Table 43

Out of 80,250.53 ha leased in land, major portion i.e. 38,626.88 ha (48.13%) of land are found to have leased on contract on crop sharing basis followed by contract on cash basis which was reported as 32261.35 ha (40.2%). There are various ways of leasing land in the district viz. contract on kind basis (8.57%), 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)	32261.36	0.00	0	0.00	32261.35 (40.20%)
	Mean (ha/HH)	.1508	0.00	0.00	0.00	0.15
Contract (kind)	Sum (ha)	6875.00	0.00	0	0.00	6875.0 (8.57%)
	Mean (ha/HH)	.0321	0.00	0.00	0.00	0.03
Crop sharing	Sum (ha)	38626.89	0.00	0.00	0.00	38626.88 (48.13%)
	Mean (ha/HH)	.1806	0.00	0.0000	0.00	0.18
Exchange for service	Sum (ha)	0.00	0.00	0	0.00	0.00 (0%)
	Mean (ha/HH)	0.0000	0.00	0.00	0.00	0.00
Mortgage	Sum (ha)	2352.83	0.00	0	0.00	2352.833 (2.93%)
	Mean (ha/HH)	.0110	0.00	0.00	0.00	0.01
Others	Sum (ha)	134.45	0.00	0	0.00	134.448 (0.17%)
	Mean (ha/HH)	.0006	0.00	0.00	0.00	0.001
<b>Total</b>						<b>80250.53</b>

Source: Annex Table 44

### 3.4 Cropping Patterns and Cropped Area

Rice-Wheat-fallow (33.7%), Rice-fallow-fallow (26.69%) and Rice-Pulse-Fallow (11.46%) were major cropping pattern of Khet land with mean land holding of 0.3898, 0.3087 and 0.1326 ha/HH.

**Table 3.6: 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	18643.97	7.54	.0872
Rice-Wheat-Fallow	83369.05	33.70	.3898
Rice-Wheat-Maize	6131.41	2.48	.0287
Rice-Wheat-Vegetable	2427.08	0.98	.0113
Rice-Pulses-Fallow	28354.43	11.46	.1326
Rice-Wheat-Moong (green gram)	2052.03	0.83	.0096
Rice-Wheat-Dhaincha (Sun hemp)	606.72	0.25	.0028
Rice-Potato-Fallow	1490.41	0.60	.0070
Rice-Maize-Fallow	7630.75	3.08	.0357
Rice-Fallow-Fallow	66032.16	26.69	.3087
Rice-Barley-Fallow	0.00	0.00	0.0000
Rice-Millet-Fallow	1008.36	0.41	.0047
Other	29621.12	11.97	.1385
<b>Total (n= 213870)</b>	<b>247367.48</b>	<b>100.00</b>	

Source: Annex Table 45

Maize/Upland rice-Fallow (22.92%), Jute-Tori- Fallow (14.17%), Vegetable-Vegetable (8.22%) and Maize/Millet-Fallow (8.16%) 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	5898.89	22.92	.0276
Maize/Millet-Fallow	2100.74	8.16	.0098
Maize/Millet-Wheat	0.00	0.00	0.00
Upland rice-Fallow-fallow	0.00	0.00	0.00
Maize-Tori-Fallow	336.12	1.31	.0016
Maize- Rice-Wheat	0.00	0.00	0.00
Maize-Barley	319.31	1.24	.0015
Jute-Tori-Fallow	3646.89	14.17	.0171
Jute-Wheat- Fallow	436.95	1.70	.0020
Vegetable-Vegetable	2116.36	8.22	.0099
Vegetable-Maize	1680.59	6.53	.0079
Off season vegetable	168.06	0.65	.0008
Others	9029.06	35.09	.0422
<b>Total (n= 213870)</b>	<b>25732.98</b>	<b>100.00</b>	

Source: Annex Table 46

### 3.5 Use of improved seeds

About 51.16 percent of the HHs reported to have used improved seeds. Out of households using improved seeds, 92.07% households used improved seeds of rice followed by wheat (53.56%) and Maize (21.93%).

**Table 2.8: HH using improved seeds (%)**

Use of improved seeds	HH							
	No. of HH	%	Rice	Wheat	Maize	Pulses	Vegetables	Sugarcane
Yes	109415	51.16	100280 (92.07%)	58341 (53.56%)	23890 (21.93)	993 (0.91)	2053 (1.88)	7648 (7.02)
No	104454	48.84						
<b>Total</b>	<b>213869</b>	<b>100.00</b>						

Source: Annex Table 47 and 48

### 3.6 Marketing of Farm Product

Following table presents the distribution of HH selling their farm product in different places. Rural haat bazar is found to be the major place where 55.14 percent of households sell their products, which is followed by farm gate accounting for 38.23 percent of households. Only 3.37 percent of household sells their product in sell centers followed by district market (3.26%).

**Table 2.9: Frequency and percentage of HH selling produce at different places**

Place of sale	HH	
	No.	%
Farm gate	47376	38.23
Rural haat bazar	68335	55.14
District market	4038	3.26
Vendor		0.00
Cooperatives		0.00
Sell centers	4174	3.37
Others	2481	2.00
<b>Total</b>	<b>123923</b>	<b>100.00</b>

Source: Annex table 49

### 3.7 Use of Chemical Fertilizers and Pesticides

As regards to the use of chemical fertilizer and pesticides, 79.5 percent of the households have used chemical fertilizers and pesticides.

**Table 2.10: Use of fertilizer and pesticides by the households**

Use of chemical fertilizer and pesticides	HH	
	No	%
Yes	170039	79.50
No	43834	20.50
<b>Total</b>	<b>213873</b>	<b>100.00</b>

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

<b>Nitrogen</b>	<b>Phosphate</b>	<b>Potash</b>
36.19	21.10	1.60

Source: MoAD (2014)

From the following table, it is clear that out of 170036 households using fertilizers and pesticides, 85.47 percent of households reported that fertilizers and pesticides were available as and when needed.

**Table 2.12: Frequency and percentage of households reporting availability of chemical fertilizer and pesticides**

<b>Response</b>	<b>HH</b>	
	<b>No.</b>	<b>%</b>
Yes	145331	85.47
No	24705	14.53
<b>Total</b>	<b>170036</b>	<b>100.00</b>

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 sources, from where 53.85 percent of the HH buy them, followed by agro-vets (44.68%).

**Table 2.13: HH buying fertilizers/pesticides from different sources (%)**

<b>Source</b>	<b>HH</b>	
	<b>No.</b>	<b>%</b>
Cooperatives	82884	53.85
Agro vets	68763	44.68
DADOs/ASCS	496	0.32
Neighbor farmers		0.00
Relatives		0.00
Others	8212	5.34
<b>Total</b>	<b>153904</b>	<b>100.00</b>

Source: Annex Table 52

Among the reported that they get the information on safe use of fertilizer and pesticides 52.25% of HHs get information from purchasing shop followed by own experience (43.22%) and extension service (16.82%)

**Table 2.14: Frequency of households reporting source of information for safe use of fertilizer and pesticides**

<b>Source</b>	<b>HH</b>	
	<b>No.</b>	<b>%</b>
From Purchasing Shop	48437	52.25
Extension Service	15589	16.82
Neighboring Farmers	993	1.07
Friends		0.00
Relatives	496	0.54
Own Experience	40068	43.22
Other	496	0.54
<b>Total</b>	<b>92700</b>	<b>100.00</b>

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, non-availability in time is reported by 49.21 percentage of the HH and lack of money was reported by 47.07 percent households.

**Table 2.15: HH reporting reasons for low use of fertilizers/pesticides**

Reason	HH	
	No.	%
Not available	33726	49.21
No money	32263	47.07
Other	2549	3.72
<b>Total</b>	<b>68538</b>	<b>100.00</b>

Source: Annex Table 54

Survey report show that the existence of advice on safe use of fertilizer and pesticides was reported by 44.04 percent of households.

**Table 2.16: HH reporting on advisory on safe use of fertilizer and pesticides**

Response	HH	
	No.	%
Yes	94188	44.04
No	119679	55.96
<b>Total</b>	<b>213867</b>	<b>100.00</b>

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 87.53 percent of the households have held livestock.

**Table 2.17: Frequency and percentages of households raising livestock**

Response	HH	
	No.	%
Yes	187205	87.53
No	26667	12.47
<b>Total</b>	<b>213872</b>	<b>100.00</b>

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, goat and buffaloes were raised by 9.55%, 1.86 and 0.23% of HH.

**Table 2.187: Types of breeds of livestock owned**

Animal	Type	HH (%)	Animal (no.)	Mean (Animal/HH)
Cattle	Local	72.59	454628	2.93
	Improved	9.55	66074	3.24
Buffalo	Local	17.87	76394	2.00
	Improved	0.23	993	2.00
Goat	Local	66.11	586463	4.15
	Improved	1.86	17866	4.50



Sheep	Local	0.23	2481	5.00
Pig	Local	15.18	62736	1.93
	Improved	0.23	496	1.00
Others	Local	1.39	6452	2.17
	Improved			
<b>Total</b>		<b>n=213872</b>		

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 65.81 percent of the HH have reared their livestock in the shed separately; it was followed by in the residential house (32%) and both type (2.19%).

**Table 2.19: Place of housing of livestock**

Place of housing livestock	HH	
	No.	%
In the shed separately	123200	65.81
In the residential house	59899	32.00
Both	4104	2.19
<b>Total</b>	<b>187203</b>	<b>100.00</b>

Source: Annex Table 58

### 3.13 Milk and Milk Products

Among those HH who have raised livestock, 43.91 percent have reported that they sell milk and milk products. The amount of milk sold per annum was found to be 4077.17 litres per household

**Table 2.20: Milk and milk products production and sale**

Response	HH		Average milk sold/year (litre)
	No.	%	
Yes	82211	43.91	<b>4077.17</b>
No	104993	56.08	-
<b>Total</b>	<b>187204</b>	<b>100.00</b>	

Source: Annex Table 59 and 60

Large percentage (60.51) of the HH sold their milk at home followed by 29.88 percent in collection center and 6.66% percent HH sold milk at hotel.

**Table 2.21: HH selling milk at different places**

Different Place to sell Milk	HH	
	No.	%
Home	46316	60.51
Collection center	22876	29.88
Village		0.00
Neighbor	1128	1.47
District headquarter	1692	2.21
Hotel	5099	6.66
Others		0.00
<b>Total</b>	<b>76547</b>	<b>100.00</b>

Source: Annex Table 61

### 3.14 Feeds and feeding

Regarding the type of feeding for the livestock, stall feeding was practiced by 55.3 percent household while feeding in pasture land was reported by 9.23 percent. Stall feeding as well as feeding in pasture land both was reported by 35.47 percent households.

**Table 2.22: HH with different type of feeding**

Type of feeding	HH	
	No.	%
Stall feeding	103526	55.30
Feeding in pasture land	17282	9.23
Both	66394	35.47
<b>Total</b>	<b>187202</b>	<b>100.00</b>

Source: Annex Table 62

Regarding the type of feeds given to the livestock, fodder/straw were fed by 52.66 percent of HH. green grasses also constituted major portion of livestock feed as it was fed by 50.49 percent of households followed by 35.17 percent who mixed feed to their livestock.

**Table 2.23: Livestock feeds and feeding types**

Types of Feeds	HH	
	No.	(%)
Fodder/straw	85976	52.66
Green Grasses	82434	50.49
Forage	9430	5.78
Concentrates	6091	3.73
Mixed	73747	45.17
Other		0.00
<b>Total</b>	<b>163266</b>	<b>100.00</b>

Source: Annex Table 63

### 3.14 Poultry

Poultry was raised by 39.92 percent of the households in the district.

**Table 2.24: Households raising poultry**

Rearing of poultry	HH	
	No.	%
Yes	85385	39.92
No	128484	60.08
<b>Total</b>	<b>213869</b>	<b>100.00</b>

Source: Annex Table 64

Of the total birds, local birds were raised by majority of the household. (Table 2.25)

**Table 2.25: Average number of improved and local poultry breed reared**

Types of Birds	Nos of HHs	HH%	No. of birds	Mean
Poultry				
Local Chick	29056	13.59	212488	7.31
Local Cock	46562	21.77	185366	3.98
Local Hen	57977	27.11	228251	3.94
Local dry	496	0.23	2481	5.00
Improved Broiler		0.00		

Improved Layer		0.00		
Duck				
Local Chick	5663	2.65	24725	4.37
Local Cock	18770	8.78	51461	2.74
Local Hen	21251	9.94	68424	3.22
Local Dry		0.00		
Pigeon				
Local Chick	4670	2.18	24704	5.29
Local Cock	28471	13.31	173174	6.08
Local Hen	29960	14.01	190973	6.37
Local Dry		0.00		
Other				
Other Local Chick	564	0.26	2821	5.00
Other Local Cock	564	0.26	2821	5.00
Other Local Hen	564	0.26	2821	5.00
<b>n=213872</b>				

Source: Annex Table 66

### 3.16 Fishery

Fishery was found one of the important components of agriculture in the district, the share of households in this field is found to be 2978 households with average area of 1.33 ha of pond area. Survey result show that the volume of sell of fish was found 12437 metric tons from the district in last year.

**Table2.26: 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)
2978	1.33	3.5	12437027

Source: Annex Table 67

### 3.17 Forest

As regards to the HH involving in forest land, a total of 36.48% of the HH have reported access to compact forest followed by community forest (31.91%), NTFP area (15.11%), scatter forest (10.08%) and other forest (6.72%).

**Table2.27: Frequency and percentage of HH having different forest area**

Different forest area	No. of HHs	Sum (ropani)	Mean(ha)
Compact Forest	10693 (36.48%)	101379	9.48
Scatter Forest	2978 (10.08%)	1488.87	.500
NTFP Area	4467 (15.11%)	4466.61	1.00
Community Forestry	9430 (31.91%)	3138041.67	332.78
Other Forest Area	1985 (6.72%)	1985.16	1.00
<b>Total</b>	<b>(n= 29553)</b>		

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 60.25 percent of the HH out of 213871 households. In case of climatic hazards, 96.9 percent of the HH who have experienced climate change reported extreme high temperature which is followed by experience on *drought* (88.78%), *cold* (38.3%), *hail storm* (19.81%), *extreme, flood* (18.98%), and *extreme frost* (10.73%).

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

Experiencing climate change	HH	
	No.	%
Climate change	128865	60.25
<b>Experiencing Climatic Hazards</b>		
Hail Storm	25336	19.81
Extreme high temperature	123902	96.90
Extreme cold	48980	38.30
Extreme Frost	13718	10.73
Floods	24276	18.98
Drought	113501	88.76
Others	6091	4.76
<b>Total</b>	<b>127872</b>	<b>100.00</b>

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 69306 households who got support, 68.65 percent reported family support as main support. Either own saving or own asset was reported by 59.83% and 13.38 percent of the households.

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

Agencies	HH	
	No.	%
Government support	1985	2.86
Family support	47580	68.65
INGO	1489	2.15
Saving	41467	59.83
Asset	9272	13.38

Friend/relative	9205	13.28
Others	496	0.72
<b>Total</b>	<b>69306</b>	<b>100.00</b>

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, 85.81% of household reported that they protect agriculture followed by protect livestock (40.79%), protect household goods (40.31%) and protect lives (39.97%).

**Table 3.3: Households taking measures to mitigate climatic hazards**

Measures	HH	
	No.	%
Protect lives	24140	39.97
Protect household goods	24343	40.31
Protect agriculture	51822	85.81
Protect livestock	24636	40.79
Protect others	564	0.93
<b>Total</b>	<b>60394</b>	<b>100.00</b>

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, 85.03% of the household reported experiencing change in climate.

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

Response	HH	
	No.	%
Yes	181862	85.03
No	32012	14.97
<b>Total</b>	<b>213874</b>	<b>100.00</b>

Source: Annex Table 73

Among HH who had experienced change in climate, 89.65% of the HH reported low rainfall during rainy season while 12.37% reported high rainfall. Frequent droughts and floods were reported by 61.47% and 5.21% HH in rainy season. More frequent drought (93.46%), frequent hailstorm (74.38%) and less rain fall (35.85%) of HHs reported during dry 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	65200	35.85	163041	89.65	53039	29.16	180865	99.45
More overall rainfall	13514	7.43	22494	12.37	39614	21.78	69892	38.43
More frequent drought	169968	93.46	111787	61.47	64004	35.19	179804	98.87
More frequent flood	993	0.55	9476	5.21		0.00	10469	5.76
Strong wind	104432	57.42	2549	1.40	4038	2.22	107478	59.10
More cold spells or foggy days	8144	4.48	3046	1.67	74765	41.11	82909	45.59
Higher temperature	19673	10.82	3542	1.95	2617	1.44	21658	11.91
Frequent hailstorm	135270	74.38	29510	16.23	21026	11.56	139715	76.82
Lower ground water table	2549	1.40	993	0.55	993	0.55	3046	1.67
<b>Total</b>	<b>n=181862</b>							

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 33.3 percent of the HH in the district.

**Table 3.6: Households reporting receipt of early warning messages**

Response	HH	
	No.	%
Yes	71224	33.30
No	142648	66.70
<b>Total</b>	<b>213872</b>	<b>100.00</b>

Source: Annex Table 75

Among various sources of early warning messages (such as telephone, Radio/TV, siren, Bulletin/Newspaper), HHs have reported about the early warning was received from Radio/TV (95.6%).

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

Sources	HH	
	No.	%
Telephone	5595	8.08
Radio/TV	66193	95.60
Siren	6023	8.70
Colorful flag	4467	6.45
Hand mike	8640	12.48
Bulletin/newspaper	17010	24.57
Others	496	0.72
<b>Total</b>	<b>69238</b>	<b>100.00</b>

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, 95.74 percent of HH preferred FM Radio/TV, SMS on mobile (77.05%), digital display board (68.8%), telephone (22.75%) and siren (17.85%) as medium for delivery of early information . Internet is preferred by 11.28 percent of HHs.

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

Medium for delivery of Early information	HH	
	No.	%
Telephone	46833	22.75
SMS on mobile	158621	77.05
Siren	36751	17.85
FM Radio/TV	197085	95.74
Newspaper	84487	41.04
Digital display board	141633	68.80
Internet	23215	11.28
Others	1128	0.55
<b>Total</b>	<b>205861</b>	

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 45.77 percent of the households. Second priority was given agro vet (33.31%) followed by ASC/LSC (17.89%).

**Table 3.9: Priority of location suitable for Digital Display Board**

Location	HH	
	No.	%
DADO/DLSO offices	93803	45.77
Agriculture/Livestock Sub Center	36663	17.89
VDC/DDC offices	564	0.28
Markets	4670	2.28
Agro Vet	68268	33.31
Other place	992	0.48
<b>Total</b>	<b>204960</b>	<b>100.00</b>

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 35 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, mostly from DADO and DLSO in the district, were only on crop production and livestock/fishery farming. Negligible portion of the HH has reported advisory on vegetable/fruits, plant protection and marketing etc.

### 4.3.3 Need for Agro Advisory

At present very limited respondents are found to have not taken advisory, they were interested to have advice from the service providers. In this regards, 99.43 percent of the HH have preferred mobile service, 77.86 percent toll free service, 64.8 percent digital display board at district office, and 64.03 percent newspaper/bulletin. Very few HH (27.82%) have preferred internet service.

**Table 3.10: HH preferring advisory services by type**

Types of advisory	HH	
	No.	%
Mobile service	186235	99.43
Telephone	39661	21.18
Newspaper/Bulletin	119931	64.03
Toll free	145828	77.86
Internet service	52114	27.82
Digital display board	121374	64.80
Others	6655	3.55
<b>Total</b>	<b>187295</b>	<b>100.00</b>

Source: Annex Table 81

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#### **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 13.84 percent of the households regularly listened. Only 17.08 percent of the household reported watching agricultural program in television and 10.42 percent of the HH read newspapers and magazines. This shows that communication media are not effectively penetrating to general mass of people (annex Tables 82, 83 and 84)



**Annex 1****Average Maximum and Minimum Temperature and Rainfall (2000-2010), Biratnagar airport**

<b>Month</b>	<b>Maximum Temperature ( °C)</b>	<b>Minimum Temperature ( °C)</b>	<b>Rainfall (cm)</b>
January	22.3	9.2	12.6
February	26.4	11.6	10.5
March	31.4	16.2	10.4
April	33.8	21.3	66.6
May	33.4	23.4	215.5
June	33.0	25.2	322.6
July	32.6	25.9	515.2
August	33.1	26.0	378.4
September	32.6	24.9	274.2
October	31.9	21.5	102.4
November	29.4	15.8	1.5
December	25.6	10.8	1.0