

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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CHAPTER I: INTRODUCTION

1.1 General Information

Chitwan is one of the Terai districts of 25 pilot districts of Building Resilience to Climate Related Hazards Project (BRCH), situated in Narayani zone of Central Development Region (CDR). Geographically, the district is located in the latitude of 27° 21' to 27° 52' N and the longitude of 83°55' to 84°48' E (Figure 1). The head-quarter of the district is Bharatpur Municipality. It borders with Makawanpur and Parsa districts in the east, Nawalparasi and Tanahu districts in the west, Gorkha and Dhading district in the north and Bihar and Uttar Pradesh of India in south.

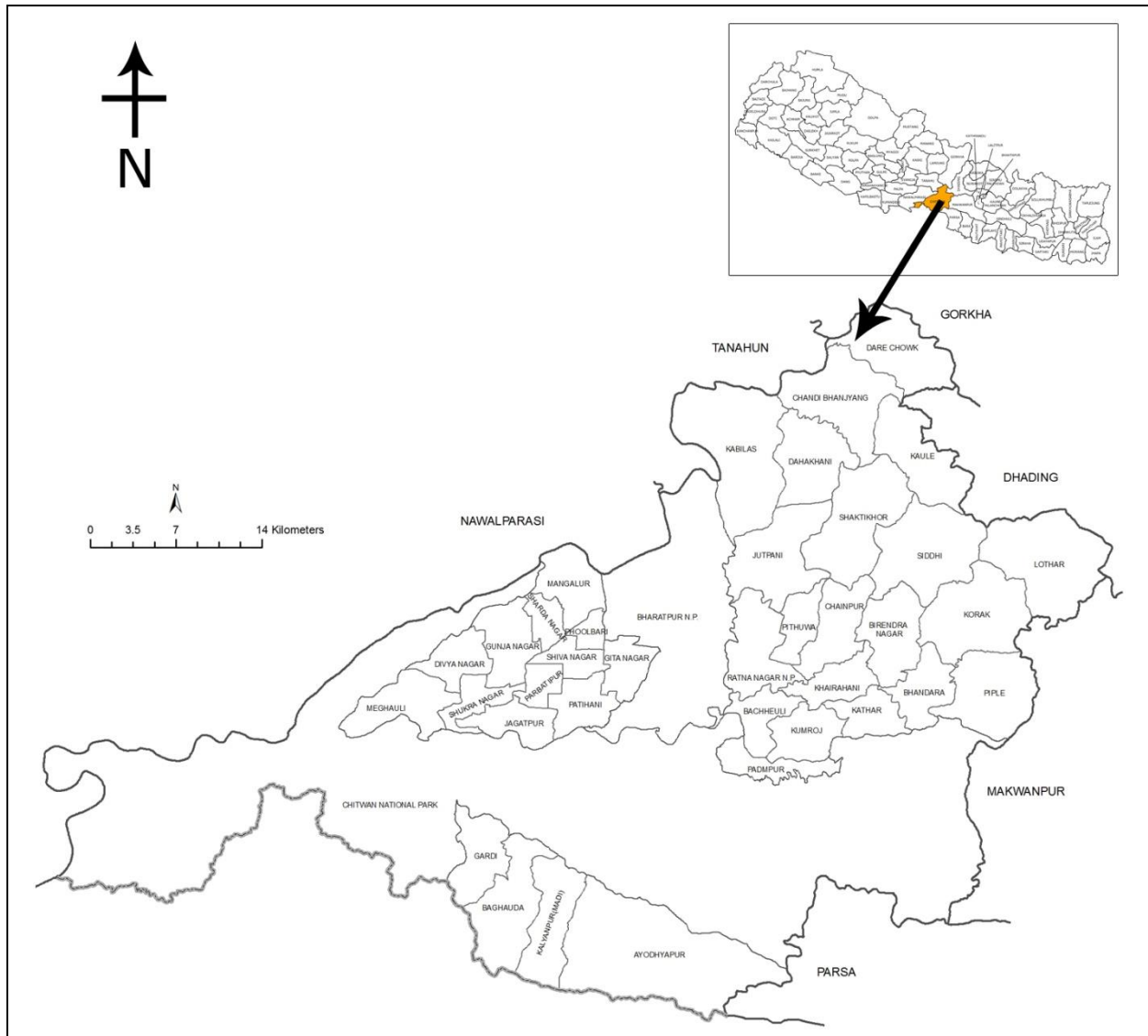


Figure 1: Location Map of Bara District

It occupies 2,218 sq.km area which is 1.5% of total area of Nepal. Most part of Chitwan district lies on Siwalik region (86.5%) followed by Mid-mountain region (12.7%) and Terai region (0.8%). Elevation of the district ranges from 144 m to 1945 m. Administratively, the district comprises 2 Municipalities and 36 Village Development Committees (VDCs), 13 Ilakas and five electoral constituencies. Bharatpur is the district headquarters of Chitwan.

The population of the district consists of 5,79,984 with 2,79,097 male and 3,00,897 female with 1,32,462 HH and household size of 4.38 as of 2011 census. Annual population growth rate is 2.06% with a density of 261 persons/sq.km., which is more than the national population density of 180 persons/sq. km. as of 2011 census.

1.2 Land Utilization

Among total land of Chitwan 59.7% of land is occupied by forest and 34.7% of land is used for Agriculture and grass land. Similarly, only 2.8% of land is shrub. 1.7% of total land is barren land and 1.1% water bodies. The total area of the district is 2, 23,839 ha with total cultivable land area of 46,894 ha, out of which 44,532 ha is cultivated. (DADO, 2014).

1.3 Climate and Rainfall

Consistent to the national topographical variation, the district has also the diversity of weather and climate according to the elevation of the district. As the altitude of the district varies, climate of the district which is mainly tropical i.e. where summer is warm/hot and winter is cool, also varies with different altitudes, the classification of which is given as under:

Lower Tropical climate: Areas located at altitudes below of 300 msl consisted of this type of climate, where summer is hot and winter is warm. Plenty of agricultural land is available in this area. Hence, crops like rice, maize, wheat, and lentil are produced. Different type of vegetables and fruits like mango, litchi, pineapple, jackfruit, and banana etc. are commonly cultivated.

Upper-tropical climate: Areas located at altitudes of 300 to 1000 msl consisted of this type of climate, where summer is hot and winter is cool. Agricultural land suitable for rice, maize, wheat, , and black gram are available in this climatic area. Different type of vegetables and fruits are commonly cultivated in this area.

Sub-tropical climate: This type of climate is present at altitudes of 800 to 2,000 msl, where winter is cold and summer is warm. Peach, persimmon, orange, litchi, lime, and banana are the main fruits cultivated in this type of climate. Millet, maize, buckwheat, rice, mustard, and different types of vegetables are the main crops.

The average temperature of the district varies from minimum 7⁰C in the winter (January) to maximum 37.9⁰C in the summer in June ;and rainfall varies from minimum 5.40 mm in the winter to maximum 302.6 mm in summer. The detailed climatological records are in the Annex 1.

CHAPTER II: DEMOGRAPHIC AND SOCIO-ECONOMIC CHARACTERISTICS

This section focuses on the demographic and socio-economic characteristics 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)	92.8	108.38
Dependency ratio	61.53	42.86
Household (HH) size	4.38	5.01
Percent of female headed households	17.1	17.89
HH (%) who own their housing unit	74.88	94.52
HH (%) with piped drinking water	34.97	34.03
HH (%) with access to electricity	85.93	90.33
HH (%) with access to Telephone/Mobile	92.51	82.86
HH (%) with toilet	94.09	99.36
HH (%) using firewood for cooking	49.06	38.93
Literacy rate	77.3	92.54

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 52.01 percent is higher than 47.99 percent of female population giving sex ratio of 108.38 in the district. About 20.01 percent of population were under 15 years and 9.99 percent were of 60 years or more old. Thus majority of population (69.99%) were from age group 15-59 years (Table 1.2). The survey data revealed that the overall dependency ratio is 42.86 percent. Regarding the HH size, the average HH size of the district is found to be 5.01 compared to 4.38 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	17464	2.63	12673	1.91	30137	4.54%
5-9 Years	23865	3.59	19056	2.87	42921	6.46%
10-14 Years	31495	4.74	28392	4.27	59887	9.01%
15-19 Years	41728	6.28	33486	5.04	75214	11.32%
20-24 Years	28842	4.34	40433	6.09	69275	10.43%
25-29 Years	34708	5.22	32174	4.84	66882	10.07%
30-34 Years	29754	4.48	27298	4.11	57052	8.59%
35-39 Years	31941	4.81	26867	4.04	58808	8.85%
40-44 Years	22970	3.46	17581	2.65	40551	6.10%
45-49 Years	20816	3.13	18414	2.77	39230	5.90%
50-54 Years	14716	2.22	16433	2.47	31149	4.69%
55-59 Years	13499	2.03	13354	2.01	26853	4.04%
60-64 Years	14877	2.24	11692	1.76	26569	4.00%
65+ Years	18870	2.84	20962	3.16	39832	6.00%
Total	345545	52.01	318815	47.99	664360	100.00%

Source: Annex Table 1

2.2 Household head and members

Son/daughter constituted largest percentage (36.12%) of household members followed by household heads which constituted 19.92 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	108665	16.36	23680	3.56	132345	19.92
Husband/wife	9603	1.45	94071	14.16	103674	15.61
Son/daughter	152791	23.00	87168	13.12	239959	36.12
Grand children	43915	6.61	27132	4.08	71047	10.69
Son/daughter in law	21972	3.31	63817	9.61	85789	12.91
Daughter/son in law	1360	0.20	3782	0.57	5142	0.77
Parent	2936	0.44	7748	1.17	10684	1.61
Father/mother in law	0	0.00	1808	0.27	1808	0.27
Brother/sister in law	1924	0.29	2770	0.42	4694	0.71
Household widow	0	0.00	282	0.04	282	0.04
Others	2372	0.36	6552	0.99	8924	1.34
Total	345538	52.01	318810	47.99	664348	100.00

Source: Annex Table 2

From the Table 1.3, it is seen that out of 19.92 percent household heads, female formed 3.56 percent of heads in comparison to 16.36 percent of male members who were household heads thus giving overall female household head percentage as 17.89 percent.

2.3 Marital Status of head of households

A total of 63.07 percent of HH members were married. Widow members of the household constituted 3.74 percent of the population. A total of 31.71 percent of population were married male whereas married female population accounted for 31.36 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	187483	31.71	185443	31.36	372926	63.07
Divorced	564	0.10	564	0.10	1128	0.19
Separate	680	0.12	962	0.16	1642	0.28
Widow/widower	3849	0.65	18260	3.09	22109	3.74
Unmarried	111628	18.88	81845	13.84	193473	32.72
Total	304204	51.45	287074	48.55	591278	100.00

Source: Annex Table 3

Female gender had higher percentage of widow (3.09%) than male gender (0.65%). Unmarried male constituted more (18.88%) of total population than unmarried female (13.84%).

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 92.54 percent compared to 73.7 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 21.82 percent, is followed by lower secondary level (13.7%), inter/equivalent (12.4%), primary (11.76%), secondary (10.51%) and SLC/equivalent (10.23%). People having graduated and above graduate level are found 8.9 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	3401	0.54	43883	6.92	47284	7.46
Can read and write	62921	9.92	75474	11.90	138395	21.82
Beginners	11294	1.78	9091	1.43	20385	3.21
Primary (1-5)	44993	7.09	29621	4.67	74614	11.76
L. Secondary (6-8)	46402	7.32	40485	6.38	86887	13.70
Secondary (9-10)	38278	6.04	28393	4.48	66671	10.51
SLC/Equivalent	44084	6.95	20817	3.28	64901	10.23
Inter/Equivalent	45175	7.12	33467	5.28	78642	12.40
Grad/Equivalent	22243	3.51	20339	3.21	42582	6.71
PG/Equi/above	9290	1.46	4578	0.72	13868	2.19
Total	328081	51.73	306148	48.27	634229	100.00

Source: Annex Table 4

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

Currently 28.62 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 15.41 percent and 13.22 percent of their population respectively.

Table 1.6: Population by going to school (>5 years)

Going to School	Gender					
	Male		Female		Total	
	No.	%	No.	%	No.	%
Yes	97287	15.41	83470	13.22	180757	28.62
No	229822	36.39	220903	34.98	450725	71.38
Total	327109	51.80	304373	48.20	631482	100.00

As regards to the accessibility to educational institutions in terms of time, 67.64 percent of the respondents have reported that distance to reach is less than 1 km, whereas 21.79 percent reported distance of 1-5 km, 4.53 percent reported distance of 5-10 km and 6.04 percent reported more than 10 km. (Table 1.7).

Table 1.7 Population by distance to education institution (>5 years)

Distance	Gender		Total
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	Male		Female			
	No.	%	No.	%	No.	%
Less than 1km	67104	37.12	55163	30.52	122267	67.64
1-5 km	19505	10.79	19882	11.00	39387	21.79
5-10 km	4977	2.75	3218	1.78	8195	4.53
Greater than 10 km	5706	3.16	5210	2.88	10916	6.04
Total	97292	53.82	83473	46.18	180765	100.00

Source: Annex Table 6

Accessibility to educational institution by gender shows that 90.83 percent of the respondents have reported that institutions can be reached within less than 1 hour (Table 1.8). Also comparatively higher male (2.07%) than female (0.91%) 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	86889	48.07	77300	42.76	164189	90.83
1-2 hours	6669	3.69	4529	2.51	11198	6.19
More than 2 hours	3733	2.07	1643	0.91	5376	2.97
Total	97291	53.82	83472	46.18	180763	100.00

Source: Annex Table 7

Regarding mode of transport, 53.51 percent of the population reported travelling on foot for educational institution, 21.64 percent reported using vehicles like school bus and 17.52 percent using bicycle. (Table 1.9)

Table 1.9: Population by mode of transportation to education institution (>5 years)

Mode of transport	Gender				Total	
	Male		Female			
	No.	%	No.	%	No.	%
On foot	52676	54.14	44050	24.37	96726	53.51
Bus	21989	22.60	17135	9.48	39124	21.64
Bicycle	16286	16.74	15393	8.52	31679	17.52
Foot and bus	2439	2.51	3684	2.04	6123	3.39
Other	3899	4.01	3218	1.78	7117	3.94
Total	97289	100.00	83480	46.18	180769	100.00

Source: Annex Table 8

2.6 Occupation

As revealed from the table 1.10, among various types of occupations adopted by the people, 28.21 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 2.27 percent of the population. Student as their occupation accounting for 22.99 percent is followed by household work as their occupation accounting for 16.09 percent. About 10.71 percent of the population was engaged in non-agricultural salaried work, is followed by external jobs in abroad accounting for 9.56 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 2.26 and 0.6 percent in comparison to 8.45 and 8.96 percent reported by male.

Table 1.10: Distribution of population by types of occupation

Main Occupation	Gender				Total	
	Male		Female		Total	
	No.	%	No.	%	No.	%
Own agriculture	78604	13.29	88206	14.92	166810	28.21
Salaried/wage agriculture	8378	1.42	5044	0.85	13422	2.27
Non agriculture salary	49992	8.45	13354	2.26	63346	10.71
Own enterprises	12557	2.12	6619	1.12	19176	3.24
Abroad external job	52951	8.96	3568	0.60	56519	9.56
Household work	8776	1.48	86376	14.61	95152	16.09
Student	72625	12.28	63287	10.70	135912	22.99
No work	15355	2.60	18260	3.09	33615	5.68
Other	4976	0.84	2372	0.40	7348	1.24
Total	304214	51.45	287086	48.55	591300	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 23.73 percent of the households, followed by easier lifestyle (2.79%) and education (2.28%).

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

Reason for Migration	HH	
	No	%
Family reason	564	0.28
Education/training	4528	2.28
Natural disaster	1526	0.77
Looking for work	47148	23.73
Easier lifestyle	5539	2.79
No migration	138546	69.73
Other reason	846	0.43
Total	198695	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, 14.05 percent of the population are associated with saving and credit cooperative followed by agriculture cooperatives (6.59%), seed production (3.42%), vegetable production group (3.13%), commercial crop production (2.86%), agriculture marketing group (2.67%) and farmer field school (2.54%). However, other than the above mentioned institutions, their associations in category 'others' are found to be 23.88 percent.

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

Types of organizations	Gender				Total	
	Male		Female		Total	
	No.	%	No.	%	No.	%
Farmers Field School	7465	1.26	7564	1.28	15029	2.54
Vegetable	7794	1.32	10700	1.81	18494	3.13
Water Users Group	5657	0.96	2206	0.37	7863	1.33
Commercial Crop Production	9108	1.54	7797	1.32	16905	2.86
Saving credit co-operative	41432	7.01	41646	7.04	83078	14.05
Agricultural co-op group	17581	2.97	21409	3.62	38990	6.59
Agriculture marketing	9090	1.54	6670	1.13	15760	2.67
Seed production	8992	1.52	11247	1.90	20239	3.42

Other	73568	12.44	67652	11.44	141220	23.88
Not in Group	123535	20.89	110204	18.64	233739	39.53
Total	304222	51.45	287095	48.55	591317	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 Brahman/Chhetri, which accounted for 51.6 percent of the total population, followed by Adibasi/Janajati (40.58%), Madhesi (4.72%) and Dalit (3.65%).

Table 1.13: Distribution of population by ethnicity

Ethnicity	Gender				Total	
	Male		Female		No.	%
	No.	%	No.	%		
Adibasi/Janajati	139241	20.96	130320	19.62	269561	40.58
Brahman/Chhetri	175427	26.41	163785	24.65	339212	51.06
Dalit	13670	2.06	10552	1.59	24222	3.65
Madhesi	17200	2.59	14147	2.13	31347	4.72
Others		0.00		0.00		0.00
Total	345538	52.01	318804	47.99	664342	100.00

Source: Annex Table 11

2.10 Housing Ownership

Regarding the ownership of the houses, almost all the HH (94.52%) reported that they have their own houses followed by rented houses (3.64%). Very insignificant number of HH is found to have lived in relative's house, land owner's house and institutional houses.

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

Types of house ownership	HH	
	No.	%
Own house	125095	94.52
Rented house	4811	3.64
Relative's house	962	0.73
Land owner's house (included in rented land)	796	0.60
Institutional house	680	0.51
Total	132344	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, large portion (48%) of the HH were found to have lived in concrete roof/pakki houses, 42.74 percent semi-pakki houses in and only 9.26 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	63526	48.00
Semi-pakki (tin/tile/slate roof)	56565	42.74

Kacchi- thatched roof	12256	9.26
Others	0	0.00
Total	132347	100.00

Source: Annex Table 14

2.11 Households Asset

The most common assets owned by the people are found to be telephone/mobile reportedly constituting 24.46 percent of household items followed by fan/heater (24.36%), cycles (14.51%), assets including jewellery (11.81%) and TV (10.02%) 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 assets including Jewelleries formed largest (61.35%) portion of the net value of the all the assets owned by the households followed by motorcycle/scooter (15.46%), tractor/power tiller (7.71%) and telephone/mobile (3.69%) 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	83586	7.45	43199669	0.20
Cycles	162742	14.51	286417290	1.35
Motorcycle/scooter	41878	3.73	3278305425	15.46
Car/jeep	0	0.00	0	0.00
Bus/truck	282	0.03	84555000	0.40
Telephone/mobile	263257	23.46	783122493	3.69
Washing machine	0	0.00	0	0.00
Refrigerator	564	0.05	4227750	0.02
Sewing machine	13700	1.22	66571110	0.31
Fan/heater	273323	24.36	517237365	2.44
TV	112463	10.02	920118765	4.34
Assets including Jewelries	132510	11.81	13010044050	61.35
Tractor/power tiller	3780	0.34	1636011000	7.71
Thresher/pump set/sprayers	0	0.00	0	0.00
Mill/Ghatta/turbine	680	0.06	93742500	0.44
Others	33203	2.96	483924225	2.28
Total	1121967	100.00	21207476642	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, 29.92% of the HH have reported they have food sufficiency for 12 or more months. A total of 32.93% 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	21482	16.23
3 to less than 6 months	15508	11.72
6 to less than 9 months	12178	9.20
9 to less than 12 months	43581	32.93
12 months or surplus	39601	29.92
Total	132350	100.00

Source: Annex Table 16

2.13 Source of Energy

As regards to the source of energy for lighting, almost all the households (90.33%) have electricity, 8.09 percent households have used solar for lighting, and insignificant percent have used kerosene and biogas for lighting.

Among various sources of energy for cooking, cylinder gas remained a main fuel for cooking, accounting for 49.59% of the total HH. About 38.93% and 10.24% of the HH have used firewood 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	119545	90.33
	Biogas	398	0.30
	Solar	10710	8.09
	Kerosene	1410	1.07
	Other	282	0.21
	Total	132345	100.00
Cooking fuel	Timber/ firewood	51523	38.93
	Cow dung cake		0.00
	Straw/ dry grass/ eaves/rubbish	1078	0.81
	Cylinder gas	65633	49.59
	Biogas	13547	10.24
	Kerosene	282	0.21
	Other	282	0.21
	Total	132345	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 53.33% of the HH followed by piped water (34.03%). 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	45036	34.03
Covered well	2256	1.70
Hand pump/tube-well	70577	53.33
Open well	4744	3.58
Spring water	564	0.43
River		0.00
Other	9174	6.93
Total	132351	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 the district. Majority of HH (99.36%) have access to toilet in their HH. Majority (70.46%) of the HH have reported that they

have toilet with flush (connected to safety tank) followed by toilet without flush 28.09%. Very less percentage (0.51%) of people have toilet with flush connected to sewer and 0.64% 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)	680	0.51
Toilet with flush (connected to safety tank)	93243	70.46
Toilet without flush	37177	28.09
Public toilet	398	0.30
No toilet	846	0.64
Total	132344	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 hospital cater substantial percentage of households (48.8%), which is followed by government health post/PHC (26.17%), government district hospital (10.09%), private pharmacy/clinic (8.62%) and government other institutions (5.89%). Ayurveda and mobile centers were cited by none and other privates negligible portion of the households.

Table 1.21: Distribution of HH consulting different health institutions

Health service provider	HH	
	No.	%
Government health post/PHC	34642	26.17
Government district hospital	13352	10.09
Government mobile clinic		0.00
Government Ayurveda center		0.00
Government other institution	7797	5.89
Private hospital	64585	48.80
Private pharmacy/clinic	11410	8.62
Private health worker's home	282	0.21
Private others	282	0.21
Total	132350	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 30.19% followed by 20.57% expenses on education, 11.73% in input cost for agriculture/livestock/other enterprises.

Table 1.22: Expenditure distribution of HH by different items

Items of expenditure	HH (No).	Total expenditure		Average expenditure/HH (Rs)
		Rs	%	
Food	132345	4843144500	30.19	36595
Fuel	112015	1356406350	8.46	12109

Apparel and personal items	126506	990792045	6.18	7832
Social and religious activities/donation/charity	96906	297237083	1.85	3067
Insurances and taxes	84719	254612472	1.59	3005
Repair and maintenance of house, vehicles, equipment	86043	523832114	3.27	6088
Transportation	120685	510250065	3.18	4228
Newspaper/communication	97151	357361573	2.23	3678
Disaster related expenses	23467	105337200	0.66	4489
Input cost for agriculture/livestock/other enterprises	120452	1881583179	11.73	15621
Health	123804	1588123125	9.90	12828
Education	95711	3299870445	20.57	34477
Cash losses	1526	21683775	0.14	14213
Other	1360	10716150	0.07	7878
Total	n=132345	16040950075	100.00	121206

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 34.28 percent followed by non agricultural wages/labor (28.05%), and sale of agricultural products (8.26%). Own enterprise come to be fourth position with contribution of 7.56 percent of the income. Combining the income from different heading as given in the following table the average income is found to Rs. 263295.

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	10447	645807165	1.85	61819
Nonagricultural wages/salary	53606	9775905900	28.05	182367
Sale of agricultural products	49366	2879854049	8.26	58337
Livestock/fisheries sale	23963	1336541130	3.84	55775
Milk and milk product sale	32173	2209629158	6.34	68679
Remittances	45108	11944142400	34.28	264792
Occupational work (tailoring, black smithy, carpentry etc)	5821	1203106200	3.45	206693
Forestry related products sale	282	64825500	0.19	230000
Pension	6783	1303948350	3.74	192246
Own enterprise	10814	2635051500	7.56	243665
Others	5704	846992100	2.43	148482
Total	n=132345	34845803452	100.00	263295

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.142090 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 30.32 percent of households have taken loan during the last 12 months.

Table 1.24: Frequency and percentage of HH taking loan

Loan taken	HH	
	No.	%
Yes	40133	30.32
No	92211	69.68
Total	132344	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 88.22 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	117417	88.72
No	14928	11.28
Total	132345	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 43.62 to 83.16 percent. Similarly drought was reported by 19.83 percent to 28.93 percent households as risk on cereals and 6.83% in vegetable. Risk of flood was reported by negligible portion of the respondents. while risks due to hailstone on rice, wheat and maize was reported by 17.06%, 15.62%, and 10.37% of households respectively.

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

Crop/ livestock	No of HHs and %	Risks in crops and livestock due to climatic hazards						
		Disease pest	Drought	Flood	Hail stone	All	Others	Total
Rice	No of HHs	78696	52025	2089	30782	1691	15140	180424
	%	43.62	28.83	1.16	17.06	0.94	8.39	100.00
Wheat	No of HHs	54709	19454	282	15324		8357	98125
	%	55.75	19.83	0.29	15.62	0.00	8.52	100.00
Maize	No of HHs	23583	13418	962	4810	282	3333	46388
	%	50.84	28.93	2.07	10.37	0.61	7.19	100.00
Mustard	No of HHs	13731	4362		846		2371	21310
	%	64.43	20.47	0.00	3.97	0.00	11.13	100.00
Vegetable	No of HHs	11709	962			282	1127	14080
	%	83.16	6.83	0.00	0.00	2.00	8.01	100.00
Potato	No of HHs	16053	282				1691	18026
	%	89.05	1.56	0.00	0.00	0.00	9.38	100.00
Cow	No of HHs	282						282
	%	100.00	0.00	0.00	0.00	0.00	0.00	100.00
Buffalo	No of HHs	14809	1244		282		2089	18424
	%	80.38	6.75	0.00	1.53	0.00	11.34	100.00
Sheep	No of HHs							0
	%							
Goat	No of HHs	8474	1127				1691	11292

	%	75.04	9.98	0.00	0.00	0.00	14.98	100.00
Chicken	No of HHs	3615	680	282	282		846	5704
	%	63.37	11.92	4.94	4.94	0.00	14.82	100.00
Duck	No of HHs	14576	4908	282	3499		3217	26481
	%	55.04	18.53	1.06	13.21	0.00	12.15	100.00
Other	No of HHs	372962	187219	26861	90785	7279	62184	747291
	%	49.91	25.05	3.59	12.15	0.97	8.32	100.00
Total	No of HHs	78696	52025	2089	30782	1691	15140	180424
	%	43.62	28.83	1.16	17.06	0.94	8.39	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 100 percent of the household have reported that cow was more prone to risks due to diseases and pests followed by buffalo (80.38%) and goat (75.04%). Drought effects were reported by 9.98 percent in goat followed by 6.75% in buffalo and 18.53% in duck.

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 16.12% 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	21330	16.12
No	111015	83.88
Total	132345	100.00

Source: Annex Table 27

Among the household who have knowledge on crop/livestock insurance, none of the household has insurance their crop and 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, 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 100% respondents cited lack of information was the major reason for non-insuring.

Table 1.28: Frequency and percentage of household reporting reason for not doing insurance

Reason for not doing insurance	HH	
	No.	%
Lack of information	15789	100.00
High premium rate		0.00
No access to the service		0.00
Poor insurance service		0.00
Problem in getting back the insured amount		0.00
Others		0.00
Total	15789	100.00

Source: Annex Table 29

Leader farmers/neighbor/relatives, TV/Radio, Newspaper and ASCs/LSCs were reported as major sources of information on agriculture insurance reported by 83.11, 78.16, 37.88 and 25.58 percent of the respondents.

Table 1.29: Frequency and percentage of households reporting source of information on agricultural insurance

Source	HH	
	No.	%
Insurance agent	680	4.946
DADOs/DLSOs	1195	8.69
Newspaper	5208	37.88
TV/Radio	10747	78.16
ASCs/LSCs	3517	25.58
Leader farmer/Neighbor/Relatives	11427	83.11
Other	962	7.00
Total	13749	100.00

Source: Annex Table 32

Among the respondent who have knowledge about insurance, 72.11% reported having knowledge about 75 percent subsidy on agriculture insurance.

Table 1.30: Frequency and percentage of households reporting 75% subsidy on agricultural insurance premium

Response	HH	
	No.	%
Yes	13420	72.11
No	5191	27.89
Total	18611	100.00

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 (89.77%) 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 0.1087 ha/HH and overall irrigated land is 0.0641 ha/HH with average number of parcel land is 1.24. Land for permanent crops is higher; the average area covered is 0.2741 ha/HH with average irrigated area of 0.1909 ha. Average temporary graze land, temporary fallow, permanent graze and land for fishery was found very insignificant level.

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	.1087	1.24	.0641
Temporary graze land	.0000	0.00	0.0000
Temporary fallow	.0008	1.00	0.0005
Permanent crops	.2741	1.29	.1909
Permanent graze land	.0062	1.48	.0028
Appropriate for forest	.0047	1.23	.0012
Appropriate for fishery	.0002	0.00	0.0000
No of HH = 132345			

Source: Annex Table 35

3.3 Source of Irrigation:

Out of the respondents, who have managed to irrigate in their field with different sources of irrigations for temporary crops, majority (60.92%) 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 (15.35%), and natural flow canal (13.9%). Similarly continuous flow canal was reported as source by 59.25 percent respondents in case of irrigated agricultural land followed by tube well, boring (20.53%) and natural flow canal (11.39%).

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	3004	15.35	10915	20.53	-	-	-	-
Continuous flow canal	11924	60.92	31496	59.25	-	-	-	-
Natural flow canal	2721	13.90	6056	11.39	-	-	-	-
Pond/ well		0.00		0.00	-	-	-	-

Mixed		0.00	398	0.75	-	-	-	-
Others	1925	9.83	4296	8.08	-	-	-	-
Total	19574	100.00	53161	100.00	-	-	-	-

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

Leased land

Out of the respondent 6.56% of respondent have given land to others on lease and the average holding of leased out land is 0.0149 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	3951.67	.0299		
Bari	0.00	.0000		
Total	3951.67	.0149	8678	6.56

Source: Annex Table 41 and 42

A total of 14.31% of household 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	18940	14.31
No	113406	85.69
Total	132346	100.00

Source: Annex Table 43

Out of 13212.25 ha leased in land, major portion i.e. 3663 ha (52.88%) of land are found to have leased on contract (kind) basis followed by crop sharing basis (27.73%) and contract (cash) basis (15.35%). There are various ways of leasing land in the district viz. mortgage (3.89%), exchange for service 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)	1977.88	50.00	0.00	0.00	2027.88 (15.35%)
	Mean (ha/HH)	0.01	0.00	0.00	0.00	0.02
Contract (kind)	Sum (ha)	6222.90	763.55	0.00	0.00	6986.45 (52.88%)
	Mean (ha/HH)	0.05	0.01	0.00	0.00	0.05
Crop sharing	Sum (ha)	3663.96	0.00	0.00	0.00	3663.96 (27.73%)
	Mean (ha/HH)	0.03	0.00	0.00	0.00	0.03
Exchange for service	Sum (ha)	0.00	10.11	0.00	0.00	10.11 (0.08%)
	Mean (ha/HH)	0.00	0.00	0.00	0.00	0.00
Mortgage	Sum (ha)	513.73	0.00	0.00	0.00	513.73 (3.89%)
	Mean (ha/HH)	0.00	0.00	0.00	0.00	0.00
Others	Sum (ha)	0.00	10.11	0.00	0.00	10.11 (0.08%)
	Mean (ha/HH)	0.00	0.00	0.00	0.00	0.00
Total						13212.25

Source: Annex Table 44

3.4 Cropping Patterns and Cropped Area

Rice-Wheat-Fallow (22.82%) and Rice-Wheat-Maize (8.65%) and Rice-Fallow-Fallow (7.79%) were major cropping pattern of khet land with mean land holding of 0.1067, 0.0505 and 0.0364 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	14124.47	22.82	.1067
Rice-Wheat-Fallow	2952.72	4.77	.0223
Rice-Wheat-Maize	5354.76	8.65	.0405
Rice-Wheat-Vegetable	42.95	0.07	.0003
Rice-Pulses-Fallow	926.00	1.50	.0070
Rice-Wheat-Moong (green gram)	0.00	0.00	.0000
Rice-Wheat-Dhaincha (Sun hemp)	257.70	0.42	.0019
Rice-Potato-Fallow	57.27	0.09	.0004
Rice-Maize-Fallow	1718.53	2.78	.0130
Rice-Fallow-Fallow	4820.23	7.79	.0364
Rice-Barley-Fallow	67.43	0.11	.0005
Rice-Millet-Fallow	392.14	0.63	.0030
Other	31193.15	50.39	.2357
Total (n= 132345)	61907.33	100.00	.4678

Source: Annex Table 45

Maize/Millet-Fallow (28.2%), Maize/Upland rice-Fallow (22.38%) and Maize-Tori-Fallow (11.58%) 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	1855.44	22.38	.01402
Maize/Millet-Fallow	2337.71	28.20	.01766
Maize/Millet-Wheat	95.44	1.15	.00072
Upland rice-Fallow-fallow	581.25	7.01	.00439
Maize-Tori-Fallow	959.83	11.58	.00725
Maize- Rice-Wheat	0.00	0.00	.00000
Maize-Barley	0.00	0.00	.00000
Jute-Tori-Fallow	0.00	0.00	.00000
Jute-Wheat- Fallow	0.00	0.00	.00000
Vegetable-Vegetable	408.85	4.93	.00309
Vegetable-Maize	64.01	0.77	.00048
Off season vegetable	0.00	0.00	.00000
Others	1986.76	23.97	.01501
Total (n= 132345)	8289.28	100.00	.06263

Source: Annex Table 46

3.5 Use of improved seeds

About 51.12 percent of the HHs reported to have used improved seeds. Among this 86.49 percent households were using improved seeds of rice followed by maize (22.38%) and wheat (6.09%)..

Table 2.8: HH using improved seeds (%)

Use of improved seeds	HH	
	No.	%
Yes	67650	51.12
No	64694	48.88
Total	132344	100.00

Source: Annex Table 45 and 46

Table 2.9: HH using different kinds of seeds (%)

Commodity	HH	
	Nos	%
Rice	57680	86.49
Wheat	4062	6.09
Maize	14926	22.38
Oilseed	2604	3.90
Pulses	962	1.44
Vegetables	6286	9.43
Potato	282	0.42
Sugarcane		0.00
Other	2157	3.23
Total	66687	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 38.02 percent of households sell their products, which is followed by rural haat bazar accounting for 18.21 percent and sell centres by 16.64 percent of households. Only 6.72 percent of household sells their product in distant market followed by vendor (1.51%). Among the respondent of 28.06 percent sell their product to other types of market than mentioned.

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

Place of sale	HH	
	No.	%
Farm gate	28424	38.02
Rural haat bazar	13614	18.21
District market	5024	6.72
Vendor	1127	1.51
Cooperatives		0.00
Sell centers	12438	16.64
Others	20979	28.06
Total	74757	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 the respondent, 81.67 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	108092	81.67
No	24253	18.33
Total	132345	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
65.85	25.95	6.87

Source: MoAD (2014)

From the following table, it is clear that out of respondent households using fertilizers and pesticides, 94.46 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	102106	94.46
No	5989	5.54
Total	108095	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 agro-vets was the main source, from where 70.44 percent of the HH buy them, followed by cooperatives (27.38%).

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

Source	HH	
	No.	%
Cooperatives	25440	27.38
Agro vets	65443	70.44
DADOs/ASCS	1244	1.34
Neighbor farmers	564	0.61
Relatives		0.00
Others	2537	2.73
Total	92905	100.00

Source: Annex Table 52

A total of 68262 household reported that they get the information on safe use of fertilizer and pesticides. Out of them 65.52% of HHs get information from purchasing shop followed by own experience (19.07%), friends (16.33%), relatives (13.27%) and extension service (10.35%).

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

Source	HH	
	No.	%
From Purchasing Shop	44728	65.52
Extension Service	7065	10.35
Neighboring Farmers	5937	8.70
Friends	11145	16.33

Relatives	9056	13.27
Own Experience	13020	19.07
Other	1127	1.65
Total	68262	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 27.26 percentage of the HH and non-availability in time was reported by 8.23 percent households whereas other reason reported by 64.51% of the households..

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

Reason	HH	
	No.	%
Not available	2489	8.23
No money	8243	27.26
Other	19510	64.51
Total	30242	100.00

Source: Annex Table 54

From the survey, it was found that 53.25 percent of the household received the advisory on safe use of fertilizer and pesticides.

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

Response	HH	
	No.	%
Yes	70467	53.25
No	61875	46.75
Total	132342	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 62.36 percent of the households have held livestock.

Table 2.18: Frequency and percentages of households raising livestock

Response	HH	
	No.	%
Yes	88310	66.73
No	44034	33.27
Total	132344	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, sheep and pigs. Improved breeds of cattle, goat and buffaloes were raised by 8.58, 5.9 and 4.49% of HH.

Table 2.197: Types of breeds of livestock owned

Animal	Type	HH	HH (%)	Animal (no.)	Mean (Animal/HH)
Cattle	Local	36585	41.43	78028	2.13
	Improved	7579	8.58	17579	2.32

Buffalo	Local	33828	38.31	53079	1.57
	Improved	3964	4.49	5208	1.31
Goat	Local	49948	56.56	226801	4.54
	Improved	5208	5.90	14595	2.80
Sheep	Local	1127	1.28	2537	2.25
	Improved		0.00		
Pig	Local	2537	2.87	4510	1.78
	Improved	282	0.32	282	1.00
Rabbit	Improved	398	0.45	1195	3.00
Others	Local	2255	2.55	5073	2.25
	Improved	680	0.77	1078	1.59
Total		n=88310			

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 95.32 percent of the HH have reared their livestock in the shed separately; it was followed by in the residential house (2.63%) and both type (2.05%).

Table 2.20: Place of housing of livestock

Place of housing livestock	HH	
	No.	%
In the shed separately	84179	95.32
In the residential house	2323	2.63
Both	1808	2.05
Total	88310	100.00

Source: Annex Table 58

3.13 Milk and Milk Products

Among those HH who have raised livestock, 41.19 percent have reported that they sell milk and milk products. The amount of milk sold per annum was found to be 1526.47 litres per household.

Table 2.21: Milk and milk products production and sale

Response	HH		Average milk sold/year (litre)
	No.	%	
Yes	36371	41.19	1526.47
No	51939	58.81	-
Total	88310	100.00	

Source: Annex Table 59 and 60

Majority of the household (81.37%) sold their milk in collection center followed by home (18.14%) and hotel (1.68%).

Table 2.22: HH selling milk at different places

Different Place to sell Milk	HH	
	No.	%
Home	6103	18.14
Collection center	27382	81.37
Village		0.00
Neighbor	282	0.84
District headquarter		0.00

Hotel	564	1.68
Others		0.00
Total	33650	100.00

Source: Annex Table 61

3.14 Feeds and feeding

Regarding the type of feeding for the livestock, stall feeding was practiced by 69.62 percent household while feeding in pasture land was reported by 6.2 percent. Stall feeding as well as feeding in pasture land both was reported by 24.19 percent households.

Table 2.23: HH with different type of feeding

Type of feeding	HH	
	No.	%
Stall feeding	61480	69.62
Feeding in pasture land	5473	6.20
Both	21360	24.19
Total	88313	100.00

Source: Annex Table 62

Regarding the type of feeds given to the livestock, green grasses constituted major portion of livestock feed as it was fed by 55.78 percent of households followed by 45.86 percent who fed mixed feeds and 39.92% of HHs feed fodder/straw to their livestock.

Table 2.24: Livestock feeds and feeding types

Types of Feeds	HH	
	No.	(%)
Fodder/straw	30764	39.92
Green Grasses	42988	55.78
Forage	11709	15.19
Concentrates	28742	37.30
Mixed	35341	45.86
Other	1409	1.83
Total	77067	100.00

Source: Annex Table 63

3.14 Poultry

Poultry was raised by 29.52 percent of the households in the district.

Table 2.25: Households raising poultry

Rearing of poultry	HH	
	No.	%
Yes	39065	29.52
No	93280	70.48
Total	132345	100.00

Source: Annex Table 64

Of the total birds, local birds were raised by majority of the households. Improved breeds were being raised only in case of poultry. Only 8.53 percent of households raised improved broiler and 3.48 percent of household raised improved layer. Those who have raised poultry in the farm, the average number of improved boiler per farm is found to be at 240.11 and improved layer was found high as 2655.

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

	No of HHs	% of HHs	No of Animals	Mean
Poultry				
Local Chick	19766	50.60	345429	17.48
Local Cock	22070	56.50	66026	2.99
Local Hen	26249	67.19	80786	3.08
Local dry	4179	10.70	11341	2.71
Improved Broiler	3333	8.53	800325	240.11
Improved Layer	1360	3.48	3611594	2655.19
Duck		0.00		
Local Chick	7892	20.20	71872	9.11
Local Cock	8174	20.92	28467	3.48
Local Hen	10147	25.97	31004	3.06
Local Dry	1127	2.89	1973	1.75
Pigeon		0.00		
Local Cock	846	2.16	4228	5.00
Local Hen	846	2.16	4228	5.00
Total	n=39065			

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 1692 households with average area of 3.39 ha of pond area. Average quantity of fish sold was accounted 11887.5 kg per respondent household in the district

Table 2.27: 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)
1692	1.5	3.39	11887.5

Source: Annex Table 67

3.17 Forest

As regards to the HH involving in forest land, a total of 86.13% of the HH involving in community forest with the average holding 132.42 ha /HH followed by 3.08 percent HH involving in scatter forest area and NTFP area. Similarly, households involving in scatter forest (1.54%) and other forest area (6.16%).

Table 2.28: Frequency and percentage of HH having different forest area

Different forest area	No of HHs	% of HHs	Total area (ropani)	Mean
Compact Forest	564	3.08	564	1.00
Scatter Forest	282	1.54	281.85	1.00
NTFP Area	564	3.08	16065.45	28.50
Community Forestry	15753	86.13	2086026.63	132.42
Other Forest Area	1127	6.16	5355.15	4.75
Total	n=18290			

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 88.1 percent of the HH out of 132345 households. In case of climatic hazards, 98.1 percent of the HH who have experienced climate change reported extreme high temperature which is followed by experience on *drought* (87.42%), *hail storm* (64.56%), *extreme cold* (47.26%), *extreme frost* (35.91%) and *floods* (25.52%).

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

Experiencing climate change	HH	
	No.	%
Climate change	116591	88.10
Experiencing Climatic Hazards		
Hail Storm	75014	64.56
Extreme high temperature	113988	98.10
Extreme cold	54911	47.26
Extreme Frost	41725	35.91
Floods	29649	25.52
Drought	101581	87.42
Others	21610	18.60
Total	116194	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 95926 households who got support, 89.14 percent reporting family support as main support followed by own saving (61.55%). Either Support from their friends/relative or their assets was reported by 24.72% and 18.03 percent of the households.

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

Agencies	HH	
	No.	%
Government support	2604	2.71
Family support	85510	89.14
INGO	3333	3.47
Saving	59041	61.55
Asset	17297	18.03
Friend/relative	23712	24.72

Others	846	0.88
Total	95926	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, 84.65% of household reported that they protect their lives followed by protect agriculture (51.88%), protect household goods (37.27%) and protect livestock (31.92%).

Table 3.3: Households taking measures to mitigate climatic hazards

Measures	HH	
	No.	%
Protect lives	66105	84.65
Protect household goods	29104	37.27
Protect agriculture	40512	51.88
Protect livestock	24925	31.92
Protect others	3964	5.08
Total	78096	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, 89.76% of the household reported experiencing change in climate.

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

Response	HH	
	No.	%
Yes	118796	89.76
No	13550	10.24
Total	132346	100.00

Source: Annex Table 73

Among HH who had experienced change in climate, 62.37% of the HH reported low rainfall during rainy season while 54.54% reported high rainfall. Frequent droughts and floods were reported by 72.43% and 47.88% HH and lower ground table was reported by 26.62% HH in rainy season. Increased temperature was reported by 91.44, 88.82 and 19.92% of HH during dry, rainy and winter 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	109711	92.35	74088	62.37	48496	40.82	116145	97.77
More overall rainfall	15906	13.39	64794	54.54	7346	6.18	76405	64.32
More frequent drought	110557	93.06	86048	72.43	29404	24.75	114785	96.62
More frequent flood	5821	4.90	56884	47.88	3450	2.90	60897	51.26
Strong wind	95828	80.67	56522	47.58	24049	20.24	110704	93.19
More cold spells or foggy days	19968	16.81	4926	4.15	77618	65.34	84866	71.44
Higher temperature	108633	91.44	105514	88.82	23669	19.92	115630	97.34
Frequent hailstorm	22640	19.06	65940	55.51	9620	8.10	83040	69.90
Lower ground water table	59426	50.02	31628	26.62	35843	30.17	76362	64.28
Others	3100	2.61	2604	2.19	282	0.24	4859	4.09
Total	n=118796							

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 30.1 percent of the HH in the district.

Table 3.6: Households reporting receipt of early warning messages

Response	HH	
	No.	%
Yes	39837	30.10
No	92507	69.90
Total	132344	100.00

Source: Annex Table 75

Among various sources of early warning messages (such as telephone, Radio/TV, siren, Bulletin/Newspaper), Majority of HHs (98.59%) have reported about the early warning was received from Radio/TV followed by bulletin/newspaper (22.9%) and telephone (3.83%).

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

Sources	HH	
	No.	%
Telephone	1526	3.83
Radio/TV	39274	98.59
Siren	282	0.71
Colorful flag	282	0.71
Hand mike	564	1.41
Bulletin/newspaper	9123	22.90
Others	2089	5.24
Total	39838	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, 85.69 percent of HH preferred FM Radio/TV followed by siren (75.36%), telephone (72.65%), SMS on mobile (69.99%), digital display board (54.4%) and newspaper (31.19%) as medium for delivery of early information. Internet is preferred by 32.59 percent of HHs.

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

Medium for delivery of Early information	HH	
	No.	%
Telephone	94467	72.65
SMS on mobile	90999	69.99
Siren	97984	75.36
FM Radio/TV	111415	85.69
Newspaper	40549	31.19
Digital display board	70737	54.40
Internet	42375	32.59
Others	4062	3.12

Total	130023	100.00
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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 49.14 percent of the households. Second priority was given Agriculture/Livestock Sub Center (19.76%) followed by agro vet (16.68%) and markets (13.3%).

Table 3.9: Priority of location suitable for Digital Display Board

Location	HH	
	No.	%
DADO/DLSO offices	61681	49.14
Agriculture/Livestock Sub Center	24808	19.76
VDC/DDC offices	1128	0.90
Markets	16688	13.30
Agro Vet	20931	16.68
Other place	282	0.22
Total	125518	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 29.62 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, 29.9% of the household get advisory from DADO/DLSO on crop and livestock production. Negligible portion reported advisory on vegetable/fruits, plant protection and marketing etc.

4.3.3 Need for Agro Advisory

At present thought majority of the respondents are found to have not taken advisory, they were interested to have advice from the service providers. In this regards, 93.38 percent of the HH have preferred mobile service, 78.49 percent preferred telephone, 69.52 percent toll free service, 51.95 percent preferred digital display boards. Internet services was preferred by 34.34 percent of the respondents.

Table 3.10: HH preferring advisory services by type

Types of advisory	HH	
	No.	%
Mobile service	104632	93.38
Telephone	87948	78.49
Newspaper/Bulletin	45340	40.47
Toll free	77900	69.52
Internet service	38478	34.34
Digital display board	58213	51.95
Others	6035	5.39
Total	112046	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 16.49 percent of the households regularly listened. Only 14.59 percent of the household reported watching agricultural program in television and 16.72 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)

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

Month	Maximum Temperature (°C)	Minimum Temperature (°C)	Rainfall (cm)
January	24	7	1.0
February	26	8	1.0
March	33	12	1.0
April	35	18	1.5
May	35	20	20.0
June	35	23	30.0
July	33	24	50.0
August	33	24	45.0
September	32	22	40.0
October	31	18	10.0
November	29	12	0.5
December	24	8	0.5