
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

Dang aninner Terai district, is one of the 25 pilot districts of Building Resilience to Climate Related Hazards Project (BRCH), situated in Raptizone of Mid-Western Development Region (FWDR). Geographically, the district is located in the latitude of 27° 37' to 28° 29'N and the longitude of 82° 02' to 82° 54' E (Figure 1). The head-quarter of the district is Ghorahi.It borders with Kapilbastu, Arghakhanchi, and Pyuthan districts in the east, Banke district in the west, Salyan and Rolpa districts in the north and Uttar Pradesh of India in the south.

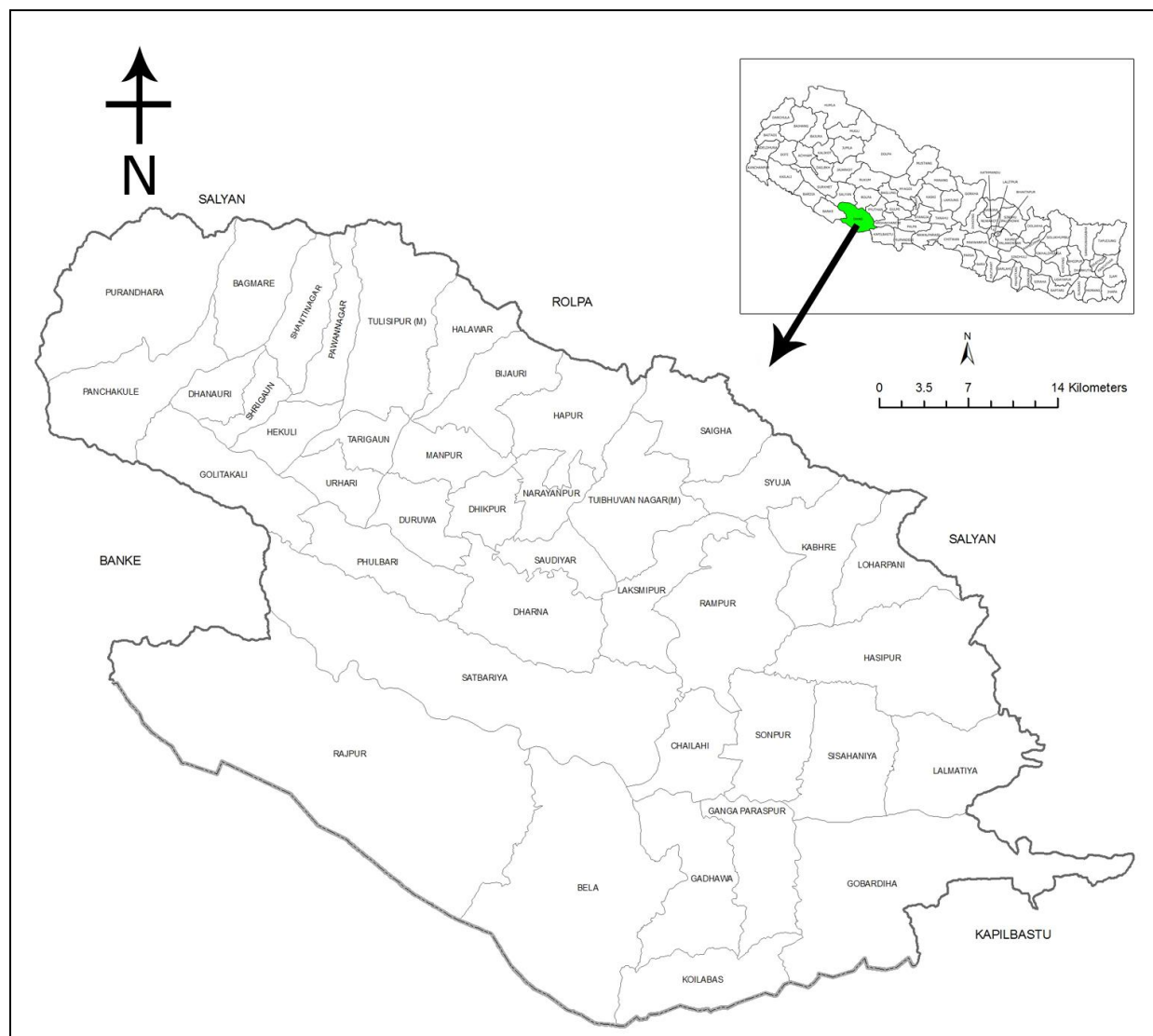


Figure 1: Location map of Dang District

This district consists of the larger easterly and upstream portions of the parallel Inner Terai valleys of **Dang** and **Deukhuri**, plus enclosing ranges of hills and mountains. Downstream, both valleys cross into Banke District, Bheri Zone. Because the international border follows the southern edge of the outermost Siwalik foothills called the Dudhwa Range, there is no Outer Terai extending onto the main Ganges Plain inside this district. The permeable geology of the Siwaliks does not support moisture retention or soil development, so they are covered with unproductive scrub forest.

The Dudhwas rise steeply to a crest at about 700 meters, then slope more gradually into the Deukhuri Valley, down to 250 meters elevation at the Rapti River. The Dudhwas extend more than 100 km, causing the Rapti to detour west around them before turning southeast down the main trend of the plains into India. Deukhuri's climate is nearly tropical and it is well watered by the river, as well as possessing abundant groundwater.

North of Deukhuri Valley, the Dang Range rises as high as 1,000 meters with passes at about 700 meters. The Dang Valley lies north of these hills, drained by the Babai River tributary to the Ghaghara (Karnali). Valley elevations range from 600 meters along the Babai with alluvial slopes gradually rising northward to 700 meters along the base of the Mahabharat Range. The district then extends upslope to the crest of the Mahabharats at 1,500 to 1,700 meters elevation. The bordering districts to the north are Pyuthan, Rolpa, and Salyan. The elevation of the district range from 213 msl in Sishaniya VDC to 2058 msl at Arkhale of Hansipur VDC.

The population of the district consists of 5,52,583 with 2,61,059 male and 2,91,524 female with 1,16,415 households as of 2011 census. The district has a density of 187 persons/sq.km., which is similar to national population density of 180 persons/sq. km. as of 2011 census.

1.2 Land Utilization

The total area of the district is 2,955 square km (2,95,500 ha) with total cultivable land area of 69,950ha (DADO, 2014). The district is covered with forest land of 1,92,155 ha, pasture land 12,950 ha and 65,980 ha cultivated land. Irrigated land constituted 58,862 ha in which seasonal irrigated area constituted 39,211 ha and 19,651 ha irrigated throughout the year.

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:

Type	Elevation	% land area
Lower Tropical	The areas located at the altitude below 300 meters (1,000 ft)	18.1%
Upper Tropical	300 to 1,000 meters 1,000 to 3,300 ft.	69.9%
Subtropical	1,000 to 2,000 meters 3,300 to 6,600 ft.	2 %

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)	98.5	105
Dependency ratio		0.52
Household(HH) size	4.75	5.11
Percent of female headed households	28.31	8.79
HH (%) who own their housing unit	89.18	99.29
HH (%) with piped drinking water	40.88	67.38
HH (%) with access to electricity	64.61	84.29
HH (%) with access to Telephone/Mobile	74.67	90.24
HH (%) with toilet	60.87	98.33
HH (%) using fire wood for cooking	76.34	60.24
Literacy rate	70.8	94.44

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 51.37 percent is higher than 48.63 percent of female population giving sex ratio of 1.05 in the district. About 24.78 percent of population were under 15 years and 10.25 percent were of 60 years or more old. Thus majority of population (68.28%) were from age group 15-59 years (Table 1.2). The survey data revealed that the overall dependency ratio is 51.30 percent. Regarding the HH size, the average HH size of the district is found to be 5.11 compared to 4.75 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	16897	2.84	19944	3.35	36841	6.19
5-9 Years	26038	4.38	21606	3.63	47644	8.01
10-14 Years	35179	5.92	27700	4.66	62879	10.57
15-19 Years	33517	5.64	36010	6.05	69527	11.69
20-24 Years	35179	5.92	35733	6.01	70912	11.92
25-29 Years	27700	4.66	25761	4.33	53461	8.99
30-34 Years	23822	4.01	23545	3.96	47367	7.96
35-39 Years	20775	3.49	24930	4.19	45705	7.69
40-44 Years	18005	3.03	17451	2.93	35456	5.96
45-49 Years	18836	3.17	16066	2.70	34902	5.87
50-54 Years	15789	2.65	13296	2.24	29085	4.89
55-59 Years	11634	1.96	8033	1.35	19667	3.31
60-64 Years	6094	1.02	5817	0.98	11911	2.00
65+ Years	16066	2.70	13296	2.24	29362	4.94
Total	305531	51.37	289188	48.63	594719	100.00

Source: Annex Table 1

2.2 Household head and members

Son/daughter constituted largest percentage (39.55%) of household members followed by household heads which constituted 19.56 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			
	No.	%	No.	%	No.	%
Head	106090	17.84	10249	1.72	116339	19.56
Husband/wife	3601	0.61	101382	17.05	104983	17.65
Son/daughter	156519	26.32	78669	13.23	235188	39.55
Grand children	33240	5.59	30470	5.12	63710	10.71
Son/daughter in law	1108	0.19	59556	10.01	60664	10.20
Daughter/son in law	0	0.00	0	0.00	0	0.00
Parent	3047	0.51	6094	1.02	9141	1.54
Father/mother in law	0	0.00	277	0.05	277	0.05
Brother/sister in law	1662	0.28	1108	0.19	2770	0.47
Household widow	0	0.00	0	0.00	0	0.00
Others	277	0.05	1385	0.23	1662	0.28
Total	305544	51.37	289190	48.63	594734	100.00

Source: Annex Table 2

From the Table 1.3, it is seen that out of 19.56 percent household heads, female formed 1.72 percent of heads in comparison to 17.84 percent of male members who were household heads thus giving overall female household head percentage as 8.79 percent.

2.3 Marital Status of head of households

A total of 65.91 percent of HH members were married. Widow members of the household constituted 2.77 percent of the population. Likewise similar percentage of male and female were found married (32.95%).

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

Marital Status	Gender				Total	
	Male		Female			
	Number	%	Number	%	Number	%
Married	168153	32.95	168153	32.95	336306	65.91
Divorced	277	0.05	554	0.11	831	0.16
Separate	277	0.05	831	0.16	1108	0.22
Widow/widower	4709	0.92	9418	1.85	14127	2.77
Unmarried	89195	17.48	68696	13.46	157891	30.94
Total	262611	51.47	247652	48.53	510263	100.00

Source: Annex Table 3

Female gender had higher percentage of widow (1.85%) than male gender (0.92%). Unmarried male constituted more (17.48%) of total population than unmarried female (13.46%).

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 94.44 percent compared to 70.8 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 those who can read and write is high at 22.10 percent, is followed by lower secondary level education (17.33%), primary level (16.43%), secondary (12.46%) and SLC/equivalent (9.29%). People having graduated and above graduate level are found 14.95 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	8033	1.44	22991	4.12	31024	5.56
Can read and write	48752	8.74	74513	13.36	123265	22.10
Beginners	6648	1.19	3878	0.70	10526	1.89
Primary (1-5)	52630	9.43	39057	7.00	91687	16.43
L. Secondary (6-8)	53184	9.53	43489	7.80	96673	17.33
Secondary (9-10)	36841	6.60	32686	5.86	69527	12.46
SLC/Equivalent	30747	5.51	21052	3.77	51799	9.29
Inter/Equivalent	25484	4.57	15789	2.83	41273	7.40
Grad/Equivalent	17728	3.18	12465	2.23	30193	5.41
PG/Equi/above	8587	1.54	3324	0.60	11911	2.14
Total	288634	51.74	269244	48.26	557878	100.00

Source: Annex Table 4

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

Currently 30.78 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 31.63 percent and 29.86 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	91133	31.63	80331	29.86	171464	30.78
No	196961	68.37	188651	70.14	385612	69.22
Total	288094	100.00	268982	100.00	557076	100.00

As regards to the accessibility to educational institutions in terms of time, 86.91 percent of the respondents have reported that distance to reach is less than 1 km, whereas 8.56 percent reported distance of 1-5 km and only 1.45 percent reported distance of 5-10 km (Table1.7).

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

Distance	Gender		Total
	Male	Female	

	No.	%	No.	%	No.	%
Less than 1km	80607	47.01	68419	39.90	149026	86.91
1-5 km	7756	4.52	6925	4.04	14681	8.56
5-10 km	277	0.16	2216	1.29	2493	1.45
Greater than 10 km	2493	1.45	2770	1.62	5263	3.07
Total	91133	53.15	80330	46.85	171463	100.00

Source: Annex Table 6

Accessibility to educational institution by gender shows that that 90.79 percent of the respondents have reported that institutions can be reached within less than 1 hour (Table 1.8). Also comparatively fewer female (1.62%) than male (1.45%) 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	85039	49.60	70635	41.20	155674	90.79
1-2 hours	3601	2.10	6925	4.04	10526	6.14
More than 2 hours	2493	1.45	2770	1.62	5263	3.07
Total	91133	53.15	80330	46.85	171463	100.00

Source: Annex Table 7

Regarding mode of transport, 90.95 percent of the educational institution going population reported travelling on foot and only 6.95 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	81993	89.97	73960	43.13	155953	90.95
Bus	6925	7.60	4986	2.91	11911	6.95
Bicycle	1385	1.52	554	0.32	1939	1.13
Foot and bus	277	0.30	554	0.32	831	0.48
Other	554	0.61	277	0.16	831	0.48
Total	91134	100.00	80331	46.85	171465	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, 20.68 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 3.04 percent of the population. Student as their occupation accounting for 24.43 percent is followed by household work as their occupation accounting for 19.65 percent. About 16.56 percent of the population was engaged in non-agricultural salaried work, is followed by external jobs in abroad accounting for 6.51 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 3.96 and 0.38 percent in comparison to 12.59 and 6.13 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	55124	10.80	50414	9.88	105538	20.68
Salaried/wage agriculture	11080	2.17	4432	0.87	15512	3.04
Non agriculture salary	64264	12.59	20221	3.96	84485	16.56
Own enterprises	5263	1.03	2770	0.54	8033	1.57
Abroad external job	31301	6.13	1939	0.38	33240	6.51
Household work	9141	1.79	91136	17.86	100277	19.65
Student	65373	12.81	59278	11.62	124651	24.43
No work	4709	0.92	5263	1.03	9972	1.95
Other	16343	3.20	12188	2.39	28531	5.59
Total	262598	51.47	247641	48.53	510239	100.00

Source: Annex Table 9

2.7 Migration

Among the migrated population, only 0.58 percent of household were found migrated for looking work, similarly 0.58 percent were migrated due to other reason.

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

Reason for Migration	HH	
	No	%
Family reason	0	0.00
Education/training	0	0.00
Natural disaster	0	0.00
Looking for work	831	0.58
Easier lifestyle	0	0.00
No migration	142382	98.85
Other reason	831	0.58
Total	144045	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, 2.61 percent of the persons are associated with saving and credit cooperative. Association with the institutions such as, water user group, commercial crop production group, agriculture marketing group, seed production is almost negligible. However, other than the above mentioned institutions, their associations in category 'others' are found to be very high at 94.19 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	277	0.05	554	0.11	831	0.16
Vegetable	0	0.00	0	0.00	0	0.00
Water Users Group	831	0.16	277	0.05	1108	0.22
Commercial Crop Production	277	0.05	0	0.00	277	0.05
Saving credit co-operative	6094	1.19	7202	1.41	13296	2.61
Agricultural co-op group	5540	1.09	3878	0.76	9418	1.85
Agriculture marketing	0	0.00	277	0.05	277	0.05
Seed production	277	0.05	0	0.00	277	0.05
Other	831	0.16	3324	0.65	4155	0.81
Not in Group	248483	48.70	232140	45.49	480623	94.19

Total	262610	51.47	247652	48.53	510262	100.00
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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 Brahmin/Chhetri, which accounted for 52.82 percent of the total population, followed by Adibasi/Janajati (37.36%), and Dalit (6.38%).

Table 1.13: Distribution of population by ethnicity

Ethnicity	Gender				Total	
	Male		Female		No.	%
	No.	%	No.	%		
Adibasi/Janajati	109978	18.49	112193	18.86	222171	37.36
Brahman/Chhetri	163159	27.43	150971	25.38	314130	52.82
Dalit	21052	3.54	16897	2.84	37949	6.38
Madhesi	9419	1.58	7479	1.26	16898	2.84
Others	1939	0.33	1662	0.28	3601	0.61
Total	305547	51.37	289202	48.63	594749	100.00

Source: Annex Table 11

2.10 Housing Ownership

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.

Regarding the ownership of the houses, almost all the HH (99.29%) 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. Among those, who have owned house, 48.33 percent of the HH were found to have lived in Semi-pakki houses, 30.48 percent in Pakki houses and only 21.19 percent of the respondents are found to have lived in Kacchi/Thatch roofed houses.

Table 1.14: Distribution of ownership of houses by types of houses

Types of house ownership	HH	
	No.	%
Own house	115508	99.29
Rented house	277	0.24
Relative's house	277	0.24
Land owner's house (included in rented land)	277	0.24
Institutional house	0	0.00
Total	116339	100.00

Source: Annex Table 13

Table 1.15: Distribution of houses by types of houses

Type of residential house	HH	
	No.	%
Concrete roof/pakki/cemented	35456	30.48
Semi-pakki (tin/tile/slate roof)	56231	48.33
Kacchi- thatched roof	24653	21.19
Others	0	0.00
Total	116340	100.00

Source: Annex Table 14

2.11 Households Asset

The most common assets owned by the people are found to be telephones/mobile phones reportedly constituting 43.16 percent of household items followed by assets including fan/heater, TV and jewellery constituting 17.57, 12.75, and 7.87 percent of the asset items. An attempt has been made to calculate the salvage value of the assets owned by the HH in the current market value. Assets like bus/truck formed largest (37.49%) portion of the net value of the all the assets owned by the households followed by jewellery and motorcycle/scooter constituting 25.29 and 12.99 percent portion of the net value of the assets. Insignificant proportion of the net value was represented by the assets like radio/ cd player, fan/heater, mill/ghatta/turbine, 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	28532	5.07	34169424	0.30
Cycles	37951	6.74	93188268	0.82
Motorcycle/scooter	17451	3.10	1469241330	12.99
Car/jeep	0	0.00	0	0.00
Bus/truck	3601	0.64	4242351210	37.49
Telephone/mobile	242940	43.16	780814133	6.90
Washing machine	0	0.00	0	0.00
Refrigerator	0	0.00	0	0.00
Sewing machine	12465	2.21	54931362	0.49
Fan/heater	98892	17.57	122410023	1.08
TV	71746	12.75	594852483	5.26
Assets including Jewellery	44322	7.87	2860959383	25.29
Tractor/power tiller	3047	0.54	991172460	8.76
Thresher/pump set/sprayers	0	0.00	0	0.00
Mill/Ghatta/turbine	1108	0.20	66484800	0.59
Others	831	0.15	4154850	0.04
Total	562888	100.00	11314729726	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, 21.43 percent of the respondent HH have reported they have food sufficiency for 12 or more months. 28.10 % of the HH have reported that food is sufficient for 9 to 12 months, indicating that overwhelming majority of the HH have food deficiency.

Table 1.171: Food sufficiency of the HH by duration

Food sufficiency level	HH	
	No.	%
Less than 3 months	29362	25.24
3 to less than 6 months	22437	19.29
6 to less than 9 months	6925	5.95
9 to less than 12 months	32686	28.10
12 months or surplus	24930	21.43
Total	116340	100.00

Source: Annex Table 16

2.13 Source of Energy

As regards to the source of energy for lighting, almost all the households (84.29%) have electricity followed by solar (6.43%), only 5.24 percent households have used kerosene for lighting.

Among various sources of energy for cooking, firewood remained main fuel for cooking, accounting for 60.24 percent of the total households. 31.43 percent of the households have used gas cylinder for cooking. Likewise 7.38 percent of the HH used biogas for cooking. The high use of firewood is the major cause of deforestation affecting the recent widespread damage in different parts of the district due to floods and landslides. Though, most of the households have access to electricity, they could not use electricity for cooking due to limited power supplied.

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

Purpose	Main source of energy	HH	
		No.	%
Light	Electricity	98057	84.29
	Biogas	831	0.71
	Solar	7479	6.43
	Kerosene	6094	5.24
	Other	3878	3.33
	Total	116339	100.00
Cooking fuel	Timber/ firewood	70081	60.24
	Cow dung cake	1108	0.95
	Straw/ dry grass/ eaves/rubbish	0	0.00
	Cylinder gas	36564	31.43
	Biogas	8587	7.38
	Kerosene	0	0.00
	Other	0	0.00
	Total	116340	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. Piped water as a source of drinking water was reported by 67.38% of the HH, followed by Open well water (13.33%), Hand pump/tube-well (8.33%) and very negligible portion from covered well, spring and river water. Thus it can be inferred that substantial percent of HH (67.38%) have access to safe drinking water.

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

Source	HH	
	No	%
Piped water	78390	67.38
Covered well	3047	2.62
Hand pump/tube-well	9695	8.33
Open well	15512	13.33
Spring water	1385	1.19
River	3047	2.62
Other	5263	4.52
Total	116339	100.00

Source: Annex Table 19

2.15 Toilet Facility

In view of health and healthy environment sanitation is an integral part of life. As revealed from the survey data, there has been significant improvement in the accessibility of toilet in both rural and urban area. Majority of HH (98.33%) have access to toilet in their HH indicating wide spread effect of recent campaigns on making districts open defecation free. Majority (65.48%) of the HH have reported that they

have toilet without flush followed by toilet with flush, but connected to safety tank (65.48%). Very insignificant percentage (65.48%) of people have toilet with flush connected to sewer.

Table 1.20: Distribution of HH using different type of toilets

Types of toilet used	HH	
	No.	%
Toilet with flush (connected to sewer)	831	0.71
Toilet with flush (connected to safety tank)	37118	31.90
Toilet without flush	76175	65.48
Public toilet	277	0.24
No toilet	1939	1.67
Total	116340	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, Government health post/PHC caters substantial percentage of HH (30.48%), followed by Private hospital (25.48%), district hospital (24.05%) and private pharmacy/clinic (18.33%), and few percentages of the HH go to other health service centers. Ayurveda and mobile centers center were cited by negligible number of the households.

Table 1.21: Distribution of HH consulting different health institution

Health service provider	HH	
	No.	%
Government health post/PHC	35456	30.48
Government district hospital	27977	24.05
Government mobile clinic	277	0.24
Government Ayurveda center	1108	0.95
Government other institution	554	0.48
Private hospital	29639	25.48
Private pharmacy/clinic	21329	18.33
Private health worker's home	0	0.00
Private others	0	0.00
Total	116340	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 27.44% followed by 17.22% expenses on education, 12.44% in health and 12.43% in apparel and personal items.

Table 1.22: Expenditure distribution of HH by different items

Items of expenditure	HH (No).	Total expenditure		Average expenditure/HH (Rs)
		Rs	%	
Food	116068	4603250610	27.44	39568
Fuel	75070	1251887673	7.46	10761
Apparel and personal items	116068	2085793542	12.43	17929
Social and religious activities/donation/charity	93076	573414780	3.42	4929

Insurances and taxes	50139	323394617	1.93	2780
Repair and maintenance of house, vehicles, equipment	31856	1397310537	8.33	12011
Transportation	105265	565297389	3.37	4859
Newspaper/communication	108866	461610789	2.75	3968
Disaster related expenses	2493	9667563	0.06	83
Input cost for agriculture/livestock/other	57896	501893760	2.99	4314
Health	100833	2085908640	12.44	17930
Education	85043	2888674710	17.22	24830
Cash losses	831	15234900	0.09	131
Other	277	11079600	0.07	95
Total	n=116339	16774419110	100.00	144186

Source: Annex Table 22

As regards to the income of the HH in the district, non-agricultural wage and salary was found to be major contributor to total annual income, which accounted for 46.67 percent followed by Livestock/fisheries sale (33.81%), and sale of agriculture products (27.86%). Remittances come to be fourth position with contribution of only 22.86 percent of the income. Combining the income from different heading as given in the following table the average income is found to Rs. 358930.

Table 1.232: Income distribution of HH by different sources

Major source of household income	HH (No.)	Total income		Average income/HH (Rs)
		Rs	%	
Agricultural wages/labor	20499	17.62	1468194900	12620
Nonagricultural wages/salary	54294	46.67	10333374854	88821
Sale of agricultural products	32411	27.86	1419705411	12203
Livestock/fisheries sale	39336	33.81	1208431549	10387
Milk and milk product sale	7479	6.43	354014730	3043
Remittances	26593	22.86	11282600400	96980
Occupational work (tailoring, black	3878	3.33	771764340	6634
Forestry related products sale	277	0.24	8310600	71
Pension	4986	4.29	812781837	6986
Own enterprise	7756	6.67	1424938500	12248
Others	25208	21.67	12673424887	108935
Total	n=116339	100.00	41757542008	358930

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.214744 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 35.0 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	40719	35.00
No	75621	65.00
Total	116340	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 86.90 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	101105	86.90
No	15235	13.10
Total	116340	100.00

Source: Annex Table 25

Among the households reporting presence of climate and weather related risks, majority 44.22 percent to 69.23 percent oversee the risk of diseases on the major crops and vegetables. Similarly drought was found to be reported by 30.77 percent to 46.97 percent households as risk on crops and vegetables respectively. Likewise risk on flood, hail and others are reported by insignificant proportion of the respondents.

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

Crop/livestock	No of HH and %	Risks in crops/livestock's due to climatic hazards						
		Disease pest	Drought	Flood	Hail stone	All	Others	Total
Rice	No of HHs	95293	79503	24377	16067	277	-	215517
	%	44.22	36.89	11.31	7.45	0.13	-	100.00
Wheat	No of HHs	89198	83935	1662	24931	554	-	200281
	%	44.54	41.91	0.83	12.45	0.28	-	100.00
Maize	No of HHs	85874	80888	1108	14682	277	-	182829
	%	46.97	44.24	0.61	8.03	0.15	-	100.00
Mustard	No of HHs	56234	53741	554	3878	-	-	114406
	%	49.15	46.97	0.48	3.39	-	-	100.00
Vegetable	No of HHs	47092	42383	277	3324	-	-	93077
	%	50.60	45.54	0.30	3.57	-	-	100.00
Potato	No of HHs	24931	11080	-	-	-	-	36012
	%	69.23	30.77	-	-	-	-	100.00
Cow	No of HHs	54572	2493	-	-	-	-	57065
	%	95.63	4.37	-	-	-	-	100.00
Buffalo	No of HHs	17729	831	-	-	-	-	18560
	%	95.52	4.48	0.00	0.00	0.00	0.00	100.00
Sheep	No of HHs	6925	-	277	277	277	-	7756
	%	89.29	-	3.57	3.57	3.57	0.00	100.00
Goat	No of HHs	41552	-	-	-	-	-	41552
	%	100.00	-	-	-	-	-	100.00
Chyangra	No of HHs	2770	-	-	-	-	-	2770
	%	100.00	-	-	-	-	-	100.00
Chicken	No of HHs	31303	-	-	-	-	-	31303
	%	100.00	-	-	-	-	-	100.00
Duck	No of HHs	1839	-	-	-	-	-	1839
	%	100.00	-	-	-	-	-	100.00

Other	No of HHs	2216	277	-	277	-	-	2770
	%	80.00	10.00	0.00	10.00	-	-	100.00
Total	No of HHs	557528	355131	28256	63436	1385	-	1005736
	%	55.43	35.31	2.81	6.31	0.14	-	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 high as 100 percent of the household have reported that goat, chyangra, chicken and duck were more prone to risks due to diseases and pests followed by cow and buffalo. Drought effects were reported by only 4.48 percent in buffalo and 4.37 percent in case of 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 only 0.71% of the HH are found to have known about it, but none of the respondents had insured the crops.

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

Knowledge on crop/ livestock insurance	HH	
	No.	%
Yes	831	0.71
No	115508	99.29
Total	116339	100.00

Source: Annex Table 27

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 no access to the service (66.67%), 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		0.00
High premium rate		0.00
No access to the service	554	66.67
Poor insurance service		0.00
Problem in getting back the insured amount		0.00
Others	277	33.33
Total	831	100.00

Source: Annex Table 29

Leader farmer/neighbor/relative and TV/Radio were reported as major sources of information on agriculture insurance and Only 831 households of respondent reported having knowledge about 75 percent subsidy on agriculture insurance.

Table 1.29: Frequency and percentage of households reporting 75% subsidy on agricultural insurance premium

Response	No.	%
Yes	831	100.00
No	0	0.00
Total	831	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 (83.81%) in the district have owned their land.

3.2 Use of Land by Type

Usually, in hill and mountain area of 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 0.3116 ha/HH and overall irrigated land is 0.2325 ha/HH with average number of parcel land is 1.76. Use of temporary fallow is also very low with average area 0.0113 ha/HH. Except for temporary crop, the use of land for permanent crops is slightly less, the average area covered is 0.1965 ha/HH with average irrigated area of 0.1675 ha. The land use for permanent meadow is also very low, the average area of which is 0.182.

Table 2.13: Distribution of HH using land by type

Type of land	Ave. area (ha)	Ave. no. of parcel	Ave. irrigated (ha)
Temporary crop	.3116	1.76	.2325
Temporary graze land	.0421	0.00	.0000
Temporary fallow	.0113	0.00	.0001
Permanent crops	.1965	1.81	.1675
Permanent graze land	.0182	1.75	.0110
Appropriate for forest	.0000	0.00	.0000
Appropriate for fishery	.0000	0.00	.0000
No. of HH			116345

Source: Annex Table 34

3.3 Source of Irrigation:

Out of 31578 respondents, who have managed to irrigate in their field with different sources of irrigations for temporary crops, majority (78.07%) of the HH have reported that their source of irrigation was continuous flow canal managed by the people themselves, which is followed by Natural flow canal (6.14%) . Similarly continuous flow canal was reported as source by 63.86 percent respondents in case of irrigated agricultural land.

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	1662	5.26	6371	13.86	-	-	-	-
Continuous flow canal	24653	78.07	29362	63.86	-	-	-	-
Natural flow canal	1939	6.14	831	1.81	-	-	-	-
Pond/ well	0	0.00	0	0.00	-	-	-	-

Mixed	1662	5.26	1662	3.61	-	-	-	-
Others	1662	5.26	7756	16.87	-	-	-	-
Total	31578	100.00	45982	100.00	-	-	-	-

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

Leased land

Only 11.90 percent of population have given land to others on lease and the average holding of leased out land is 0.0485 ha/household. Comparatively, holding of leased out Khet is higher (0.0947 ha/HH) than in Bari (0.0023 ha/HH) area.

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	11019.12	.0947		
Bari	262.65	.0023		
Total	11281.77	.0485	13850	11.90

Source: Annex Table 39 and 40

A total of 13019 households (11.19%) 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	13019	11.19
No	103320	88.81
Total	116339	100.00

Source: Annex Table 41

Out of 14629.28 ha leased in land, major portion i.e. 13297.10 ha or 90.89 percent of land are found to have leased on crop sharing basis. There are various ways of leasing land in the district viz. contract (cash or kind), exchange for service, mortgage and other, however the proportion of them is found to be low.

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

Type of land tenure system	Particulars	Khet	Bari	Orchard	Pond	Total
Contract (cash)	Sum (ha)	187.61	0.00	0	0.00	187.61
	Mean (ha/HH)	.0016	0.0000	0.00	0.0000	0.00
Contract (kind)	Sum (ha)	863.03	0.00	0	0	863.03
	Mean (ha/HH)	.0074	0.0000	0.00	0.00	0.01
Crop sharing	Sum (ha)	13203.30	93.80	0.00	0	13297.10
	Mean (ha/HH)	.1135	.0008	0.0000	0.00	0.11
Exchange for service	Sum (ha)	281.42	0.00	0	0	281.42
	Mean (ha/HH)	.0024	0.0000	0.00	0.00	0.00
Mortgage	Sum (ha)	0.00	0.00	0	0	0.00
	Mean (ha/HH)	0.0000	0.0000	0.00	0.00	0.00
Others	Sum (ha)	0.00	0.00	0	0	0.00
	Mean (ha/HH)	0.0000	0.0000	0.00	0.00	0.00

Source: Annex Table 42

3.4 Cropping Patterns and Cropped Area

Rice-Wheat-Fallow and Rice-Wheat-Maize were major cropping pattern of Khet land followed by 31.58 and 23.02 percent of the HH respectively with mean land holding of 0.1663 and 0.1212 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	7448.33	12.16	.0640
Rice-Wheat-Fallow	19351.33	31.58	.1663
Rice-Wheat-Maize	14103.59	23.02	.1212
Rice-Wheat-Vegetable	75.05	0.12	.0006
Rice-Pulses-Fallow	1904.29	3.11	.0164
Rice-Wheat-Moong (green gram)	1594.73	2.60	.0137
Rice-Wheat-Dhaincha (Sun hemp)	0.00	0.00	0.0000
Rice-Potato-Fallow	281.42	0.46	.0024
Rice-Maize-Fallow	7954.75	12.98	.0684
Rice-Fallow-Fallow	3686.63	6.02	.0317
Rice-Barley-Fallow	0.00	0.00	0.0000
Rice-Millet-Fallow	0.00	0.00	0.0000
Other	4868.55	7.95	.0418
Total	61268.66	100.00	.5266

Source: Annex Table 43

Maize-Tori-Fallow was major cropping pattern in Bari land as reported by 86.35 percent of HH whereas 2.24 percent reported Maize/Upland rice-Fallow pattern. Vegetable-Maize was another important cropping followed by 1.67 percent of HH.

Table 2.74: 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	816.13	2.24	.0070
Maize/Millet-Fallow	0.00	0.00	0.0000
Maize/Millet-Wheat	65.67	0.18	.0006
Upland rice-Fallow-fallow	0.00	0.00	0.0000
Maize-Tori-Fallow	31521.89	86.35	.2709
Maize- Rice-Wheat	0.00	0.00	0.0000
Maize-Barley	65.67	0.18	.0006
Jute-Tori-Fallow	0.00	0.00	0.0000
Jute-Wheat- Fallow	0.00	0.00	0.0000
Vegetable-Vegetable	243.89	0.67	.0021
Vegetable-Maize	609.74	1.67	.0052
Off season vegetable	0.00	0.00	0.0000
Others	3180.01	8.71	.0273
Total	36502.99	100.00	.3137

Source: Annex Table 44

3.5 Use of improved seeds

More than one-fourth (27.86%) of the HHs reported to have used improved seeds. Among this 95.69 percent households were using improved seeds of rice followed by wheat 15.52 percent and maize 12.93 percent.

Table 2.8: HH using improved seeds (%)

Use of improved seeds	HH	
	No.	%
Yes	32409	27.86

No	83931	72.14
Total	116340	100.00

Source: Annex Table 45 and 46

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

Commodity	HH	
	Nos	%
Rice	30749	95.69
Wheat	4986	15.52
Maize	4155	12.93
Oilseed	277	0.86
Pulses	554	1.72
Vegetables	277	0.86
Potato	0	0.00
Sugarcane	0	0.00
Other	0	0.00
Total	32134	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 42.97 percent of households sell their products, which is followed by village haat bazar accounting for 10.16 percent, district market (4.69%) and sell centers (4.69%). Very lower fragment of the HH sales their product to cooperatives (1.56%), vendor (6.37%) and other 35.16% of the HH sell their product in other places.

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

Place of sale	HH	
	No.	%
Farm gate	15236	42.97
Rural haat bazar	3601	10.16
District market	1662	4.69
Vendor	277	0.78
Cooperatives	554	1.56
Sell centers	1662	4.69
Others	12465	35.16
Total	35458	100.00

Source: Annex table 47

3.7 Use of Chemical Fertilizers and Pesticides

As regards to the use of pesticides out of a sample of 78945 HHs (67.86 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	78945	67.86
No	37395	32.14
Total	116340	100.00

Source: Annex Table 48

As has been reported by DADO office the farmers have used following amount of Nitrogen, Phosphate and Potash in their farm in different varieties of crops, which is given in the following table.

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

Nitrogen	Phosphate	Potash
99	61	2.9

Source: DADO (2015)

From the following table, it is clear that out of 78945 households using fertilizers and pesticides, 97.89 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

Response	HH	
	No.	%
Yes	77283	97.89
No	1662	2.11
Total	78945	100.00

Source: Annex Table 49

3.8 Sources of Fertilizers/Pesticides

There are various sources of buying fertilizers/pesticides for the use of agricultural purposes. Among them co-operatives are the main sources, from where 68.27 percent of the HH buy them, followed by Agro vets 25.83 percent. Insignificant proportion of HH has access to other sources.

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

Source	HH	
	No.	%
Cooperatives	51248	68.27
Agro vets	19391	25.83
DADOs/ASCS	277	0.37
Neighbor farmers	1662	2.21
Relatives		0.00
Others	2493	3.32
Total	75071	100.00

Source: Annex Table 51

A total of 9141 household reported source of information on safe use of fertilizer and pesticides. Among this 57.58 percent of HH receive the information for safe use of fertilizers and pesticides from purchasing shop followed by neighboring farmer 24.24 percent and extension services 12.12 percent.

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

Source	HH	
	No.	%
From Purchasing Shop	5263	57.58
Extension Service	1108	12.12
Neighboring Farmers	2216	24.24
Friends	277	3.03
Relatives	277	3.03
Own Experience	0	0.00
Other	0	0.00
Total	9141	100.00

Source: Annex Table 51

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 43.97 percentage of HH and lack of money was reported by 17.02 percent households.

Table2.15: HH reporting reasons for low use of fertilizers/pesticides

Reason	HH	
	No.	%
Not available	17174	43.97
No money	6648	17.02
Other	15235	39.01
Total	39057	100.00

Source: Annex Table 52

There is very low existence of advice on safe use of fertilizer and pesticides as only 8.57 percent of households reported its existence.

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

Response	HH	
	No.	%
Yes	9972	8.57
No	106367	91.43
Total	116339	100.00

Source: Annex Table 53

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 75.24 percent of the households have held livestock.

Table 2.17: Frequency and percentages of households raising livestock

Response	HH	
	No.	%
Yes	87532	75.24
No	28808	24.76
Total	116340	100.00

Source: Annex Table 54

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, sheep, goats, and pigs and only few proportion of household raised improved breeds of cattle, goat, sheep and pigs. Among all kinds of livestock raising, majority (76.90%) of the HH have raised goat followed by cattle (38.93%), buffalo (25.32%), pig (13.93%) and sheep (6.33%). Other livestock such as rabbit and horse/mule are raised by very few proportion of the HH.

Table2.185: Types of breeds of livestock owned

Animal	Type	HH (%)	HH	Animal (no.)	Mean (Animal/HH)
Cattle	Local	38.93	34073	101665	2.98
	Improved	4.11	3601	9141	2.54
Buffalo	Local	25.32	22161	37397	1.69

Goat	Local	76.90	67315	283110	4.21
	Improved	6.65	5817	297519	51.14
Sheep	Local	6.33	5540	24101	4.35
	Improved	0.32	277	1385	5.00
Pig	Local	13.93	12189	27979	2.30
	Improved	2.85	2493	6648	2.67
Rabbit	Local	0.63	554	2493	4.50
Horse/Mule	Local	0.95	831	1108	1.33
Total		n=87532			

Source: Annex Table 55

(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 64.56 percent of the HH have reared their livestock in the shed separately. Likewise 19.62 percent of HH reared in the residential house.

Table 2.19: Place of housing of livestock

Place of housing livestock	HH	
	No.	%
In the shed separately	56508	64.56
In the residential house	17174	19.62
Both	13850	15.82
Total	87532	100.00

Source: Annex Table 56

3.13 Milk and Milk Products

Among those HH who have raised livestock, only 4.11 percent have reported that they sell milk and milk products. The amount of milk sold per annum was found to be 990.08 litres per household

Table 2.20: Milk and milk products production and sale

Response	HH		Average milk sold/year (litre)
	No.	%	
Yes	3601	4.11	990.08
No	83931	95.89	-
Total	87532	100.00	

Source: Annex Table 57 and 58

Large percentage (50.00) of the HH sold their milk at home followed by 33.33 percent in collection centers, whereas 16.67 percent HH sold milk in hotels.

Table 2.21: HH selling milk at different places

Different Place to sell Milk	HH	
	No.	%
Home	1662	50.00
Collection center	1108	33.33
Village	0	0.00
Neighbor	0	0.00
District headquarter	0	0.00
Hotel	554	16.67
Others	0	0.00
Total	3324	100.00

Source: Annex Table 59

3.14 Feeds and feeding

Regarding the type of feeding for the livestock, stall feeding was practiced by 44.30 percent household while feeding in pasture land was reported by 12.03 percent. Stall feeding as well as feeding in pasture land both was reported by 43.67 percent households.

Table 2.22: HH with different type of feeding

Type of feeding	HH	
	No.	%
Stall feeding	38780	44.30
Feeding in pasture land	10526	12.03
Both	38226	43.67
Total	87532	100.00

Source: Annex Table 60

Regarding the type of feeds given to the livestock, mixed feed were fed by 62.31 percent of HH. Green grasses also constituted major portion of livestock feed as it was fed by 29.62 percent of households followed by 26.15 percent who fed fodder/straw and by 25.38 percent who fed concentrates.

Table 2.23: Livestock feeds and feeding types

Types of Feeds	HH	
	No.	(%)
Fodder/straw	18837	26.15
Green Grasses	21330	29.62
Forage	1662	2.31
Concentrates	18283	25.38
Mixed	44876	62.31
Other	277	0.38
Total	72024	100.00

Source: Annex Table 61

3.15 Poultry

Poultry was raised by 45.24 percent of the households in the district.

Table 2.24: Households raising poultry

Rearing of poultry	HH	
	No.	%
Yes	52630	45.24
No	63710	54.76
Total	116340	100.00

Source: Annex Table 62

Of the total birds, local birds were raised by 7.90 to 88.43 percent of household and near about 7.37 percent of households raised improved breeds of poultry. Improved breeds were being raised only in case of poultry. Those who have raised poultry in the farm, the average number of improved boiler per farm is found to be 251.66. On the other hand, the average number of local chicks and local cocks is found to be 7.99 and 2.30 respectively. Similarly the average number of ducks per HH was found to be 2.00 for local cock and 1.67 for local hen and around 4.5 in case of pigeon.

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

Type of birds	Nos of HHs	%	Sum	Mean
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Poultry				
Local Chick	38228	72.64	305271	7.99
Local Cock	35735	67.90	82273	2.30
Local Hen	46539	88.43	135737	2.92
Local dry	4155	7.90	5263	1.27
Improved Broiler	3324	6.32	836567	251.66
Improved Layer	554	1.05	0	0.00
Duck				
Local Chick	1385	2.63	7756	5.60
Local Cock	277	0.53	554	2.00
Local Hen	831	1.58	1385	1.67
Local Dry	277	0.53	277	1.00
Pigeon				
Local Chick				
Local Cock	554	1.05	2493	4.50
Local Hen	554	1.05	2493	4.50
Local Dry				
Total	(n=52630)			

Source: Annex Table 64

3.16 Fishery

As the nature of the district is mountainous, fishery is one of the unfamiliar components of agriculture, the number of HH involved in this field is found to be very low i.e. only 277 (0.24%).

3.17 Forest

As regards to the HH involving in forest land, a total of 15513 (70.59%) of the HH were found involving in community forest with the average holding 70.59 ha /HH. Similarly, 19.85, 12.98 and 11.45 percent of HH have reported owing compact, scatter and NTF area with average holding of 0.12, 0.29 and 0.27 ha/HH respectively. In other types of forest land the involvement of HH are found to be 12.98 percent.

Table 2.26: Frequency and percentage of HH having different forest area

Different forest area	No of HHs	% of HHs	Total area (ropani)	Mean
Compact Forest	7202	19.85	831	0.12
Scatter Forest	4709	12.98	1385.04	0.29
NTFP Area	4155	11.45	1108.05	0.27
Community Forestry	15513	42.75	1095058.74	70.59
Other Forest Area	4709	12.98	14127.96	3.00
Total	n=36288			

Source: Annex Table 66

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 88.10 percent of the HH out of 116339 households. In case of climatic hazards, 97.55 percent of the HH who have experienced climate change reported extreme high temperature which is followed by experience on *drought* (96.47%), *flood hazard* (91.85%), *hail storm* (56.52%), *extreme cold* (18.48%) and *extreme frost* (11.96%).

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

Experiencing climate change	HH	
	No.	%
Climate change	102489	88.10
Experiencing Climatic Hazards		
Hail Storm	57619	56.52
Extreme high temperature	99448	97.55
Extreme cold	18837	18.48
Extreme Frost	12189	11.96
Floods	93630	91.85
Drought	98340	96.47
Others	1108	1.09
Total	101941	100.00

Source: Annex Table 67 and 68

(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 57618 households who got support, 94.71 percent reporting family support as main support followed by support from own saving 87.02 percent and their own assets 59.62 percent. Support either from government or from INGO was reported by 9.62 percent of the households.

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

Agencies	HH	
	No.	%
Government support	3324	5.77

Family support	54571	94.71
INGO	2216	3.85
Saving	50139	87.02
Asset	34350	59.62
Friend/relative	20499	35.58
Others	554	0.96
Total	57618	100.00

Source: Annex Table 69

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. From the surveyed data 100 percent households protect their lives at the time of occurrence of hazards followed by to protect their household goods 95.11 percent and protect their each livestock and agriculture crop by 63.52percent.

Table 3.3: Households taking measures to mitigate climatic hazards

Measures	HH	
	No.	%
Protect lives	85043	100.00
Protect household goods	80887	95.11
Protect agriculture	54017	63.52
Protect livestock	54017	63.52
Protect others	3324	3.91
Total	85043	100.00

Source: Annex Table 70

4.2 Experience on different types Climatic Extremes in different Seasons

During last 15 years, 91.43% HH reported experiencing change in climate.

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

Response	HH	
	No.	%
Yes	106367	91.43
No	9972	8.57
Total	116339	100.00

Source: Annex Table 71

Among HH who had experienced change in climate, 24.22% of the HH reported low rainfall during rainy season while 98.70% reported high rainfall. Frequent floods and droughts were reported by 20.57% and 23.96% HH and more frost was reported by 17.97% HH in winter season. Increased temperature was reported by 59.90, 46.88, and 27.61% HH during dry, rainy and winter season while 70.58% reported decrease in water table in dry season. Frequent hail storm was reported by 9.38% of the HH during rainy season.

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	103326	97.14	25762	24.22	49031	46.10	104157	97.92
More overall rainfall	1939	1.82	104988	98.70	24100	22.66	105819	99.48
More frequent drought	80611	75.79	25485	23.96	73685	69.27	105542	99.22
More frequent flood	6094	5.73	21884	20.57	2493	2.34	26317	24.74
Strong wind	25763	24.22	831	0.78	4986	4.69	26871	25.26
More cold spells or foggy days	8310	7.81	1385	1.30	19114	17.97	24100	22.66

Higher temperature	63713	59.90	49862	46.88	29363	27.61	87813	82.56
Frequent hailstorm	5817	5.47	9973	9.38	2216	2.08	14405	13.54
Lower ground water table	75070	70.58	2770	2.60	32134	30.21	77010	72.40
Total	n=106367							

Source: Annex Table 72

(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 only 11.43 percent of the HH in the district.

Table 3.6: Households reporting receipt of early warning messages

Response	HH	
	No.	%
Yes	13296	11.43
No	103043	88.57
Total	116339	100.00

Source: Annex Table 73

Among various sources of early warning messages (such as telephone, Radio/TV, siren, Bulletin/Newspaper), Majority of HHs (97.92%) have reported about the early warning was received from Radio/TV followed by bulletin/newspaper (41.67%), telephone (12.50%) and siren (6.25%).

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

Sources	HH	
	No.	%
Telephone	1662	12.50
Radio/TV	13020	97.92
Siren	831	6.25
Colorful flag	0	0.00
Hand mike	0	0.00
Bulletin/newspaper	5540	41.67
Others	277	2.08
Total	13297	100.00

Source: Annex Table 74

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, 94.50 percent of HH preferred siren, FM Radio/TV (86.12%), SMS on mobile (79.90%), digital display board (65.55%) and newspaper (54.78%) as medium for delivery of early information. Likewise telephone and internet are preferred by 37.56 percent and 15.07 percent of HH respectively.

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

Medium for delivery of Early information	HH	
	No.	%
Telephone	43491	37.56
SMS on mobile	92522	79.90
Siren	109420	94.50
FM Radio/TV	99724	86.12

Newspaper	63436	54.78
Digital display board	75901	65.55
Internet	17452	15.07
Others	1108	0.96
Total	115791	100.00

Source: Annex Table 75

When asked about the location for fixing the digital display board, DADO/DLSO offices was given the highest priority for placing the digital display board by 50.48 percent of the households followed by Agriculture/Livestock Sub Center (22.49%) and VDC/DDC offices (14.11%).

Table 3.9: Priority of location suitable for Digital Display Board

Location	HH	
	No.	%
DADO/DLSO offices	58447	50.48
Agriculture/Livestock Sub Center	26038	22.49
VDC/DDC offices	16343	14.11
Markets	831	0.72
Agro Vet	14127	12.20
Other place	0	0.00
Total	115786	100.00

Source: Annex Table 76

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 1.43 percent of the HH are found to have received agro advisory service during the last 12 months, which can be counted in the finger (Annex Table 77).

Sources of agro advisories

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

4.3.3 Need for Agro Advisory

At present thought overwhelming majority of the respondents are found to have not taken advisory, they were interested to have advice from the service providers. In this regards, 99.28 percent of the HH have preferred mobile service, 48.80 percent toll free, 58.13 percent digital display board, 82.77 percent newspaper/bulletin and 22.73 percent telephone.

Table 3.10: HH preferring advisory services by type

Types of advisory	HH	
	No.	%
Mobile service	114960	99.28
Telephone	56511	48.80
Newspaper/Bulletin	67314	58.13
Toll free	95846	82.77
Internet service	26316	22.73
Digital display board	73131	63.16
Others	1662	1.44

Total	115791	100.00
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Source: Annex Table 79

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 4.76 percent of the households regularly listened. Only 8.10 percent of the household reported watching agricultural program in television and 15.71 percent of the HH read newspapers and magazines. (annex Tables 80.81, and 82)