

ACRONYMS

AMIS	:	Agriculture Management Information System
ASC	:	Agriculture Sub Centre
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
HH	:	HH
INGO	:	International Non-Government Organization
KII	:	Key Informants Interview
LSC	:	Livestock Service Centre
MoAD	:	Ministry of Agriculture Development
msl	:	Mean sea level
NARC	:	Nepal Agricultural Research Council
NGO	:	Non-Government Organization
VDC	:	Village Development Committee
WUG	:	Water User's Group

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CHAPTER I:INTRODUCTION

1.1 General Information

Rupandehi, a Terai district, is one of the 25 pilot districts of Building Resilience to Climate Related Hazards Project (BRCH), situated in Lumbini zone of Western Development Region (WDR). Geographically, the district is located in the latitude of 27° 20' to 27° 47' N and the longitude of 83°12' to 83°38' E (Figure 1). The head-quarter of the district is Siddharthanagar Municipality. It borders with India in South, and Palpa, Nawalparasi and Kapilvastu in the North, East and West respectively.



Figure 1: Location Map of Rupandehi District

The topography of the district is almost same as other Terai district. In the northern parts of the district lies Churiya hills, in the central part the Bhabar region and in southern parts there is plain area. The elevation begins from 100 meter above the sea level (msl) to 1229 msl.

The population of the district consists of 8, 80,196 with 4, 32,193 (49.1%) male and 4, 48,003 (50.9%) female with 1, 63, 916 HH as of 2011 census. The district has a density of 647 persons/sq.km., which is more than the density of Terai region (392 persons/sq. km.) and very high compared to national population density of 180 persons/sq. km. as of 2011 census.

1.2 Land Utilization

The total area of the district is 141367 ha with total agricultural land area of 82,622 ha (58.45%) (DADO, 2014). All of 82,622 ha of cultivable land is Khet (low land) and is under cultivation. The forest land area is 30484ha and rest is other land. While 57.70 per cent (47,668 ha) of the cultivable land is seasonally irrigated, only 12.50% (10322 ha) of the land is covered by year round irrigation.

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 can be found different in different altitudes, the classification of which is given as under:

Sub-tropical climate: Areas located at altitudes of 300 to 800 msl consisted of this type of climate, where summer is hot and winter is cool. Agricultural land suitable for rice, maize, wheat, sugarcane, and lentil are available in this climatic area. Different type of vegetables and fruits are commonly cultivated. in this area.

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, sugarcane and lentil are produced. Different type of vegetables and fruits like mango, litchi, pineapple, jackfruit, and banana etc. are commonly cultivated.

The average temperature of the district varies from minimum 8.75⁰C in the winter to maximum 45.40C in the summer; and average rainfall of the district is found 1391 mm.

CHAPTER II: DEMOGRAPHIC AND SOCIO-ECONOMIC CHARACTERISTICS

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

Table 1.1: Summary statistics of demographic and other household characteristics

Description	CBS, 2011	Base line survey, 2015
Sex ratio (number of males per 100 females)	96.5	123
Dependency ratio		0.35
Household(HH) size	5.37	5.61
Percent of female headed households	24.95	11.40
HH (%) who own their housing unit	83.69	95.08
HH (%) with piped drinking water	38.39	36.13
HH (%) with access to electricity	80.61	94.79
HH (%) with access to Telephone/Mobile	87.34	92.38
HH (%) with toilet	58.53	91.05
HH (%) using fire wood for cooking	34.34	38.98
Literacy rate	70.4	94.48

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 55.19 percent is higher than 44.81 percent of female population giving sex ratio of 123 in the district. About 19.17 percent of population were under 15 years and 7.26 percent were of 60 years or more old. Thus majority of population (73.57%) were from age group 15-59 years (Table 1.2). The survey data revealed that the overall dependency ratio is 35.92 percent. Regarding the HH size, the average HH size of the district is found to be 5.61 compared to 5.37 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	16719	1.82	12836	1.40	29555	3.21
5-9 Years	35131	3.82	31162	3.39	66293	7.21
10-14 Years	45430	4.94	35049	3.81	80479	8.75
15-19 Years	64906	7.06	52993	5.76	117899	12.82
20-24 Years	59249	6.44	49912	5.43	109161	11.87
25-29 Years	52323	5.69	41708	4.53	94031	10.22
30-34 Years	40701	4.42	36992	4.02	77693	8.45
35-39 Years	41257	4.48	28375	3.08	69632	7.57
40-44 Years	35677	3.88	31797	3.46	67474	7.33
45-49 Years	29013	3.15	32004	3.48	61017	6.63
50-54 Years	26474	2.88	17564	1.91	44038	4.79
55-59 Years	20647	2.24	15241	1.66	35888	3.90
60-64 Years	14521	1.58	10131	1.10	24652	2.68

65+Years	25630	2.79	16504	1.79	42134	4.58
Total	507678	55.19	412268	44.81	919946	100.00

Source: Annex Table 1

2.2 Household head and members

Son/daughter constituted largest percentage (36.28%) of household members followed by household heads which constituted 17.81 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	145172	15.78	18662	2.03	163834	17.81
Husband/wife	10770	1.17	129929	14.12	140699	15.29
Son/daughter	210670	22.90	123083	13.38	333753	36.28
Grand children	49282	5.36	34122	3.71	83404	9.07
Son/daughter in law	75462	8.20	84157	9.15	159619	17.35
Daughter/son in law	0	0.00	1942	0.21	1942	0.21
Parent	6966	0.76	12960	1.41	19926	2.17
Father/mother in law	-	0.00	-	0.00	-	0.00
Brother/sister in law	6206	0.67	5148	0.56	11354	1.23
Household widow	-	0.00	-	0.00	-	0.00
Others	3165	0.34	2280	0.25	5445	0.59
Total	507693	55.19	412283	44.81	919976	100.00

Source: Annex Table 2

From the Table 1.3, it is seen that out of 17.81 percent household heads, female formed 2.03 percent of heads in comparison to 15.78 percent of male members who were household heads thus giving overall female household head percentage as 11.40 percent.

2.3 Marital Status of head of households

A total of 63.41 percent of HH members were married. Widow members of the household constituted 2.80 percent of the population. A total of 34 percent of population were married male whereas married female population accounted for 29.41 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	280223	34.00	242338	29.41	522561	63.41
Divorced	1645	0.20	0	0.00	1645	0.20
Separate	422	0.05	422	0.05	844	0.10
Widow/widower	7726	0.94	15322	1.86	23048	2.80
Unmarried	165827	20.12	110208	13.37	276035	33.49
Total	455843	55.31	368290	44.69	824133	100.00

Source: Annex Table 3

Female gender had higher percentage of widow (1.86%) than male gender (0.94%). Unmarried male constituted more (20.12%) of total population than unmarried female (13.37%).

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 94.48 percent compared to 70.4 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 25.28 percent, is followed by primary level education (15.13%), lower secondary (13.05%), secondary (11.29%) and Inter/equivalent (10.86%). People having graduated and above graduate level are still found to have quite low at 7.31 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	16383	1.84	32756	3.68	49139	5.52
Can read and write	92490	10.39	132563	14.89	225053	25.28
Beginners	12115	1.36	6205	0.70	18320	2.06
Primary (1-5)	78030	8.76	56663	6.36	134693	15.13
L. Secondary (6-8)	74873	8.41	41295	4.64	116168	13.05
Secondary (9-10)	68832	7.73	31666	3.56	100498	11.29
SLC/Equivalent	47031	5.28	37742	4.24	84773	9.52
Inter/Equivalent	57721	6.48	38975	4.38	96696	10.86
Grad/Equivalent	31410	3.53	18405	2.07	49815	5.59
PG/Equi/above	12075	1.36	3165	0.36	15240	1.71
Total	490960	55.14	399435	44.86	890395	100.00

Source: Annex Table 4

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

Currently 29.29 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 29.41 percent and 29.13 percent of their population respectively.

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

Going to School	Gender					
	Male		Female		Total	
	No.	%	No.	%	No.	%
Yes	143360	29.41	115786	29.13	259146	29.29
No	344068	70.59	281686	70.87	625754	70.71
Total	487428	100.00	397472	100.00	884900	100.00

As regards to the accessibility to educational institutions in terms of time, 58.95 percent of the respondents have reported that distance to reach is less than 1 km, whereas 30.94 percent reported distance of 1-5 km and only 5.96 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	81618	31.50	71147	27.46	152765	58.95
1-5 km	45224	17.45	34963	13.49	80187	30.94
5-10 km	9208	3.55	6248	2.41	15456	5.96
Greater than 10 km	7307	2.82	3421	1.32	10728	4.14
Total	143357	55.32	115779	44.68	259136	100.00

Source: Annex Table 6

Accessibility to educational institution by gender shows that that 93.94 percent of the respondents have reported that institutions can be reached within less than 1 hour (Table 1.8). Also comparatively fewer female (0.44%) than male (1.06%) 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	133012	51.33	110420	42.61	243432	93.94
1-2 hours	7603	2.93	4223	1.63	11826	4.56
More than 2 hours	2744	1.06	1140	0.44	3884	1.50
Total	143359	55.32	115783	44.68	259142	100.00

Source: Annex Table 7

Regarding mode of transport, 50.30 percent of the educational institution going population reported travelling on foot and 24.93 percent reported using vehicles like school bus (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	65998	46.04	64350	24.83	130348	50.30
Bus	37494	26.15	27104	10.46	64598	24.93
Bicycle	36022	25.13	21242	8.20	57264	22.10
Foot and bus	760	0.53	1140	0.44	1900	0.73
Other	3082	2.15	1942	0.75	5024	1.94
Total	143356	100.00	115778	44.68	259134	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, 34.36 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 1.62 percent of the population. Student as their occupation accounting for 23.65 percent is followed by household work as their occupation accounting for 13.71 percent. About 10.95 percent of the population was engaged in non-agricultural salaried work, is followed by external jobs in abroad accounting for 9.02 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 2.37 and 0.56 percent in comparison to 8.58 and 8.46 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	144269	17.51	138931	16.86	283200	34.36
Salaried/wage agriculture	8190	0.99	5189	0.63	13379	1.62
Non agriculture salary	70707	8.58	19499	2.37	90206	10.95
Own enterprises	14945	1.81	4305	0.52	19250	2.34
Abroad external job	69726	8.46	4644	0.56	74370	9.02
Household work	15877	1.93	97077	11.78	112954	13.71
Student	111055	13.48	83819	10.17	194874	23.65
No work	17985	2.18	14059	1.71	32044	3.89
Other	3082	0.37	760	0.09	3842	0.47
Total	455836	55.31	368283	44.69	824119	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 17.06 percent of the households, followed by 2.31 percent for Easier lifestyle and 1.48% due to family reason.

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

Reason for Migration	HH	
	No	%
Family reason	3968	1.48
Education/training	2703	1.01
Natural disaster	1182	0.44
Looking for work	45729	17.06
Easier lifestyle	6200	2.31
No migration	207885	77.56
Other reason	380	0.14
Total	268047	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, 7.99 percent of the persons are associated with saving and credit cooperative. Association with the institutions such as, farmer field school, vegetable group, water user 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 87.93 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	3040	0.37	3503	0.43	6543	0.79
Vegetable	3123	0.38	802	0.10	3925	0.48
Water Users Group	802	0.10	0	0.00	802	0.10
Commercial Crop Production	760	0.09	0	0.00	760	0.09
Saving credit co-operative	39947	4.85	25926	3.15	65873	7.99
Agricultural co-op group	11950	1.45	6164	0.75	18114	2.20
Agriculture marketing	1140	0.14	380	0.05	1520	0.18
Seed production	0	0.00	380	0.05	380	0.05
Other	1140	0.14	380	0.05	1520	0.18
Not in Group	393932	47.80	330745	40.13	724677	87.93

Total	455834	55.31	368280	44.69	824114	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 Madhesi, which accounted for 40.83 percent of the total population, followed by Brahmin/Chhetri (37.30%), and Adibasi/Janajati (15.50%).

Table 1.13: Distribution of population by ethnicity

Ethnicity	Gender				Total	
	Male		Female		No.	%
	No.	%	No.	%		
Adibasi/Janajati	74412	8.09	68163	7.41	142575	15.50
Brahman/Chhetri	184245	20.03	158900	17.27	343145	37.30
Dalit	20647	2.24	15161	1.65	35808	3.89
Madhesi	213954	23.26	161707	17.58	375661	40.83
Others	14441	1.57	8357	0.91	22798	2.48
Total	507699	55.19	412288	44.81	919987	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 (95.08%) 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, majority (80.00%) of the HH were found to have lived in Pakki houses, 16.50 percent in Semi-pakki houses and only 3.51 percent of the respondents are found to have lived in Kacchi/Thatch roofed houses.

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

Types of house ownership	HH	
	No.	%
Own house	155780	95.08
Rented house	7299	4.45
Relative's house	760	0.46
Land owner's house (included in rented land)	0	0.00
Institutional house	0	0.00
Total	163839	100.00

Source: Annex Table 13

Table 1.152: Distribution of houses by types of houses

Type of residential house	HH	
	No.	%
Concrete roof/pakki/cemented	131060	80.00
Semi-pakki (tin/tile/slate roof)	27030	16.50
Kacchi- thatched roof	5744	3.51
Others	0	0.00
Total	163834	100.00

Source: Annex Table 14

2.11 Households Asset

The most common assets owned by the people are found to be fan/heater reportedly constituting 26.82 percent of household items followed by assets including telephones/mobile phones, cycles and TV constituting 26.62, 16.78, and 9.61 percent of the asset items. An attempt has been made to calculate the salvage value of the assets owned by the HH in the current market value. Expensive assets like jewellery formed largest (36.68%) portion of the net value of the all the assets owned by the households followed by motorcycle/scooter and tractor/power tiller constituting 22.22 and 17.93 percent portion of the net value of the assets. Insignificant proportion of the net value was represented by the assets like refrigerators, washing machine, 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	88002	5.66	118213560	0.33
Cycles	260914	16.78	696714670	1.95
Motorcycle/scooter	77636	4.99	7932666830	22.22
Car/jeep	380	0.02	34221600	0.10
Bus/truck	1562	0.10	1331694000	3.73
Telephone/mobile	413880	26.62	2206290236	6.18
Washing machine	0	0.00	0	0.00
Refrigerator	5323	0.34	65230172	0.18
Sewing machine	24708	1.59	136810153	0.38
Fan/heater	416914	26.82	881180055	2.47
TV	149387	9.61	1442977092	4.04
Assets including Jewelries	75677	4.87	13094100330	36.68
Tractor/power tiller	11953	0.77	6400209190	17.93
Thresher/pump set/sprayers	0	0.00	0	0.00
Mill/Ghatta/turbine	1604	0.10	497644270	1.39
Others	26758	1.72	862821953	2.42
Total	1554697	100.00	35700774110	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, about 31.61% respondent HH have reported they have food sufficiency for 12 or more months. 35.21% of the HH have reported that food is sufficient for 9 to 12 months, indicating that overwhelming 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	16587	10.12
3 to less than 6 months	15282	9.33
6 to less than 9 months	22501	13.73
9 to less than 12 months	57680	35.21
12 months or surplus	51778	31.61
Total	163828	100.00

Source: Annex Table 16

2.13 Source of Energy

As regards to the source of energy for lighting, almost all the households (94.79%) have electricity followed by kerosene (3.76%), only very few households have used solar for lighting.

Among various sources of energy for cooking, gas cylinder remained main fuel for cooking, accounting for 46.43 percent of the total households. Only, 38.98 percent of the households have used firewood for cooking. Likewise 8.25 percent of the HH used cow dung cake for cooking. 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	155309	94.79
	Biogas	380	0.23
	Solar	422	0.26
	Kerosene	6167	3.76
	Other	1562	0.95
	Total	163840	100.00
Cooking fuel	Timber/ firewood	63854	38.98
	Cow dung cake	13515	8.25
	Straw/ dry grass/ eaves/rubbish	1900	1.16
	Cylinder gas	76073	46.43
	Biogas	4985	3.04
	Kerosene		0.00
	Other	3504	2.14
	Total	163831	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 58.98% of the HH, followed by piped water (36.13%) and very negligible portion from covered well, open well, spring and river water. Thus it can be inferred that still substantial percent of HH (63.87%) have no access to safe drinking water.

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

Source	HH	
	No	%
Piped water	59193	36.13
Covered well	2785	1.70
Hand pump/tube-well	96621	58.98
Open well	1182	0.72
Spring water	2066	1.26
River	0	0.00
Other	1983	1.21
Total	163830	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 (91.05%) have access to toilet in their HH indicating wide spread effect of recent campaigns on making districts open defecation free. Majority (61.88%) of the HH have reported that they have toilet with flush, but connected to safety tank followed by toilet without flush 25.54%. Only 2.94 percent respondent HH 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)	4810	2.94
Toilet with flush (connected to safety tank)	101376	61.88
Toilet without flush	41848	25.54
Public toilet	1141	0.70
No toilet	14655	8.95
Total	163830	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 caters substantial percentage of HH (56.65%), followed by government village health post/PHC (23.15%), private pharmacy/clinic (15.46%) and few percentages of the HH go to other health service centers.

Table 1.21: Distribution of HH consulting different health institutions

Health service provider	HH	
	No.	%
Government health post/PHC	37933	23.15
Government district hospital	3123	1.91
Government mobile clinic	380	0.23
Government Ayurveda center	380	0.23
Government other institution	422	0.26
Private hospital	92804	56.65
Private pharmacy/clinic	25327	15.46
Private health worker's home	380	0.23
Private others	3083	1.88
Total	163832	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 24.59% followed by 17.52% expenses on input cost for agriculture/livestock/other, 12.95% on education, 12.35% in health and 8.24% 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	162695	6799780294	24.59	41504
Fuel	147659	1696428342	6.13	10355
Apparel and personal items	161513	2277920978	8.24	13904
Social and religious activities/donation/charity	153784	860418503	3.11	5252
Insurances and taxes	137781	658444815	2.38	4019

Repair and maintenance of house, vehicles, equipment	128440	1267984504	4.58	7739
Transportation	146733	1283515427	4.64	7834
Newspaper/communication	109279	574557409	2.08	3507
Disaster related expenses	27791	255486944	0.92	1559
Input cost for agriculture/livestock/other	139856	4845487656	17.52	29576
Health	156404	3414956180	12.35	20844
Education	130267	3582424211	12.95	21866
Cash losses	6291	112055740	0.41	684
Other	1182	28651040	0.10	175
Total	n=163834	27658112043	100.00	168818

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 41.02 percent followed by sale of agriculture products (39.35%), remittances (30.83%), and. Sale of milk and milk product comes to be fourth position with contribution of only 26.88 percent of the income. Combining the income from different heading as given in the following table the average income is found to Rs.375997.

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	12920	1056016572	7.89	6446
Nonagricultural wages/salary	67213	17009300940	41.02	103820
Sale of agricultural products	64476	6578571107	39.35	40154
Livestock/fisheries sale	27783	3115193282	16.96	19014
Milk and milk product sale	44042	3161689633	26.88	19298
Remittances	50506	21892448600	30.83	133626
Occupational work (tailoring, black	3083	1267529980	1.88	7737
Forestry related products sale	0	0	0.00	0
Pension	9539	2618109800	5.82	15980
Own enterprise	14268	3767243600	8.71	22994
Others	6968	1135035702	4.25	6928
Total	163834	61601139216	100.00	375997

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.207179 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 27.60 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	45222	27.60
No	118610	72.40
Total	163832	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 93.56 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	153284	93.56
No	10555	6.44
Total	163839	100.00

Source: Annex Table 25

Among the households reporting presence of climate and weather related risks, majority 44.02 percent to 71.34 percent oversee the risk of diseases on the major crops and vegetables. Similarly drought was found to be reported by 24.5 percent to 28.78 percent households as risk on crops and vegetables respectively. Likewise flood was reported by 1.01 percent to 7.06 percent households as risk. Risk on 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	Risks in crops/livestock's due to climatic hazards						
	Disease pest		Disease pest		Disease pest		Disease pest
Rice	143402	93358	23005	52143	8564	5323	325796
%	44.02	28.66	7.06	16.00	2.63	1.63	100.00
Wheat	125629	78537	4307	68369	1604	4183	282629
%	44.45	27.79	1.52	24.19	0.57	1.48	100.00
Maize	32420	14863	380	7646	-	1901	57210
%	56.67	25.98	0.66	13.36	-	3.32	100.00
Mustard	34809	17954	760	16011	-	760	70295
%	49.52	25.54	1.08	22.78	-	1.08	100.00
Vegetable	35421	18830	1645	8357	-	1182	65435
%	54.13	28.78	2.51	12.77	-	1.81	100.00
Potato	26815	9208	380	802	-	380	37586
%	71.34	24.50	1.01	2.13	-	1.01	100.00
Cow	14276	2786	-	-	-	380	17442
%	81.85	15.97	-	-	-	2.18	100.00
Buffalo	21285	1562	-	-	-	-	22848
%	93.16	6.84	-	-	-	-	100.00
Sheep	760	-	-	-	-	-	760
%	100.00	-	-	-	-	-	100.00
Goat	11151	1521	-	-	-	-	12672
%	88.00	12.00	-	-	-	-	100.00
Chicken	5530	1141	-	-	-	-	6671
%	82.90	17.10	-	-	-	-	100.00
Duck	380	-	-	-	-	-	380
%	100.00	-	-	-	-	-	100.00
Other	12416	3464	380	4348	-	-	20608
%	60.25	16.81	1.85	21.10	-	-	100.00
Total	464294	243224	30858	157677	10168	14110	920331
%	50.45	26.43	3.35	17.13	1.10	1.53	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 93.16 percent of the household have reported that buffalo was more prone to risks due to diseases and pests followed by goat, chicken and cow. Drought effects were reported by 17.10 percent in chicken and 15.97 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 reported 19.20% of the HH are found to have known about it and 380 respondents had insured the crops in last year.

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

Knowledge on crop/ livestock insurance	HH	
	No.	%
Yes	31454	19.20
No	132385	80.80
Total	163839	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 (26.24%), lack of information (21.62%) and poor insurance service (19.81%) and were 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	5530	21.62
High premium rate	4728	18.48
No access to the service	6712	26.24
Poor insurance service	5067	19.81
Problem in getting back the insured amount	380	1.49
Others	3166	12.37
Total	25584	100.00

Source: Annex Table 29

TV/Radio, Leader farmer/neighbor/relative, newspaper and ASCs/LSCs were reported as major sources of information on agriculture insurance by 86.93%, 80.57%, 54.77% and 32.16% of respondent's households respectively.

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

Source	HH	
	No.	%
Insurance agent	380	3.18
DADOs/DLSOs	380	3.18
Newspaper	6547	54.77
TV/Radio	10391	86.93
ASCs/LSCs	3844	32.16

Leader farmer/Neighbor/Relatives	9630	80.57
Other	802	6.71
Total	11953	100.00

Source: Annex Table 32

Out of 21068 households, 14613 (69.36%) 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	No.	%
Yes	14613	69.36
No	6455	30.64
Total	21068	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 (93.90%) 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 0.0914 ha/HH and overall irrigated land is 0.960 ha/HH with average number of parcel land is 4.30. Use of temporary fallow is also very low with average area 0.0003 ha/HH. Except for temporary crop, the use of land for permanent crops is slightly more, the average area covered is 0.5060 ha/HH with average irrigated area of 0.4091 ha. The land use for permanent meadow is also very low, the average area of which is 0.0206 ha. HH have used smallest area for fishery, the average area covered is only 0.0014 ha/HH.

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	.0914	4.30	0.0960
Temporary graze land	.0064	3.50	0.0031
Temporary fallow	.0003	1.00	0.0003
Permanent crops	.5060	2.79	0.4091
Permanent graze land	.0206	5.93	0.0152
Appropriate for forest	.0014	1.50	0.0000
Appropriate for fishery	.0107	0.00	0.0000
No. of HH			163836

Source: Annex Table 34

3.3 Source of Irrigation:

Out of 9034 respondents, who have managed to irrigate in their field with different sources of irrigations for temporary crops, majority (81.34%) of the HH have reported that their source of irrigation was tube well, boring, which is followed by continuous flow canal managed by the people themselves (18.66%). Similarly continuous flow canal was reported as source by 47.74 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	7348	81.34	48438	47.74	-	-	-	-
Continuous flow canal	1686	18.66	28758	28.34	-	-	-	-
Natural flow canal	0	0.00	20847	20.55	-	-	-	-

Pond/ well	0	0.00		0.00	-	-	-	-
Mixed	0	0.00	380	0.37	-	-	-	-
Others	0	0.00	3041	3.00	-	-	-	-
Total	9034	100.00	101464	100.00	-	-	-	-

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

Leased land

Only 4.97 percent of population have given land to others on lease and the average holding of leased out land is 0.0271 ha/household. It was found that all leased out land is Khet.

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

Leased out land			HH	
	Area (ha)	Mean (ha/HH)	No.	%
Khet	4436.42	.0271		
Bari	0.00	.0000		
Total	4436.42	.0271	8150	4.97

Source: Annex Table 39 and 40

A total of 14182 households (8.66%) 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	14182	8.66
No	149652	91.34
Total	163834	100.00

Source: Annex Table 41

Out of 30052.21 ha leased in land, major portion i.e. 24196.44 ha or 80.51 percent of land are found to have leased on contract cash basis. There are various ways of leasing land in the district viz. contract kind, crop sharing, 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)	24196.44	0.00	0.00	0.00	24196.44
	Mean (ha/HH)	0.15	0.00	0.00	0.00	0.15
Contract (kind)	Sum (ha)	632.84	0.00	0.00	0.00	632.84
	Mean (ha/HH)	0.00	0.00	0.00	0.00	0.00
Crop sharing	Sum (ha)	5222.75	0.00	0.00	0.00	5222.75
	Mean (ha/HH)	0.03	0.00	0.00	0.00	0.03
Exchange for service	Sum (ha)	0.00	0.00	0.00	0.00	0.00
	Mean (ha/HH)	0.00	0.00	0.00	0.00	0.00
Mortgage	Sum (ha)	0.00	0.00	0.00	0.00	0.00
	Mean (ha/HH)	0.00	0.00	0.00	0.00	0.00
Others	Sum (ha)	0.00	0.00	0.00	0.00	0.00
	Mean (ha/HH)	0.00	0.00	0.00	0.00	0.00

Source: Annex Table 42

3.4 Cropping Patterns and Cropped Area

Rice-Wheat-fallow and Rice-Rice-Wheat were major cropping pattern of Khet land followed by 28.69 and 6.55 percent of the HH respectively with mean land holding of .2439 and .0557 ha/HH. (Table 2.6).

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	9129.17	6.55	.0557
Rice-Wheat-Fallow	39960.27	28.69	.2439
Rice-Wheat-Maize	7632.62	5.48	.0466
Rice-Wheat-Vegetable	6099.10	4.38	.0372
Rice-Pulses-Fallow	448.99	0.32	.0027
Rice-Wheat-Moong (green gram)	0.00	0.00	.0000
Rice-Wheat-Dhaincha (Sun hemp)	871.95	0.63	.0053
Rice-Potato-Fallow	2682.22	1.93	.0164
Rice-Maize-Fallow	513.10	0.37	.0031
Rice-Fallow-Fallow	2598.21	1.87	.0159
Rice-Barley-Fallow	334.78	0.24	.0020
Rice-Millet-Fallow	5191.61	3.73	.0317
Other	63825.46	45.82	.3896
Total	139287.49	100.00	.8502

Source: Annex Table 43

Maize/Millet-Fallow was major cropping pattern in Bari land as reported by 40.51 percent of HH whereas 34.69 percent reported Vegetable-Vegetable pattern. Maize/Upland rice-Fallow was another important pattern followed by 9.84 percent of HH.

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	218.89	9.84	0.0013
Maize/Millet-Fallow	901.33	40.51	0.0055
Maize/Millet-Wheat	0.00	0.00	0.0000
Upland rice-Fallow-fallow	0.00	0.00	0.0000
Maize-Tori-Fallow	0.00	0.00	0.0000
Maize- Rice-Wheat	0.00	0.00	0.0000
Maize-Barley	0.00	0.00	0.0000
Jute-Tori-Fallow	0.00	0.00	0.0000
Jute-Wheat- Fallow	0.00	0.00	0.0000
Vegetable-Vegetable	771.69	34.69	0.0047
Vegetable-Maize	0.00	0.00	0.0000
Off season vegetable	0.00	0.00	0.0000
Others	332.83	14.96	0.0020
Total	2224.75	100.00	0.0136

Source: Annex Table 44

3.5 Use of improved seeds

About 82.45 percent of the HHs reported to have used improved seeds. Among this 97.57 percent households were using improved seeds of rice followed by wheat 67.69 percent and maize 16.18 percent.

Table 2.8: HH using improved seeds (%)

Use of improved seeds	HH	
	No.	%
Yes	135079	82.45

No	28757	17.55
Total	163836	100.00

Source: Annex Table 45 and 46

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

Commodity	HH	
	Nos	%
Rice	130308	97.57
Wheat	90407	67.69
Maize	21616	16.18
Oilseed	4563	3.42
Pulses	3083	2.31
Vegetables	19327	14.47
Potato	13590	10.18
Sugarcane	0	0.00
Other	760	0.57
Total	133557	100.00

Source: Annex Table 45 and 46

Marketing of Farm Product

Following table presents the distribution of HH selling their farm product in different places. Village haat bazar is found to be the major place where 24.08 percent of households sell their products, which is followed by sell to vendor accounting for 18.14 percent, farm gate (12.62%) and sell center (11.19%). Very lower fragment of the HH sales their product to distant market (0.83%), cooperatives (0.83%), and other 32.73% 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	11573	12.62
Rural haat bazar	22087	24.08
District market	760	0.83
Vendor	16632	18.14
Cooperatives	760	0.83
Sell centers	10258	11.19
Others	30015	32.73
Total	91705	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 163838 HH, 81.65 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	133773	81.65
No	30065	18.35
Total	163838	100.00

Source: Annex Table 48

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
61.99	31.37	1.15

Source: MoAD (2014)

From the following table, it is clear that out of 133770 households using fertilizers and pesticides, 80.97 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	108311	80.97
No	25459	19.03
Total	133770	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 agro vets are the main sources, from where 63.02 percent of the HH buy them, followed by cooperatives 28.31 percent. Insignificant proportion of HH has access to other sources.

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

Source	HH	
	No.	%
Cooperatives	33073	28.31
Agro vets	73635	63.02
DADOs/ASCS	1562	1.34
Neighbor farmers	0	0.00
Relatives	0	0.00
Others	9333	7.99
Total	116842	100.00

Source: Annex Table 51

A total of 72246 household reported source of information on safe use of fertilizer and pesticides among this 65.17 percent of HH receive the information for safe use of fertilizers and pesticides from purchasing shop followed by safely uses by own experience 20.80 percent and extension services 8.76 percent.

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

Source	HH	
	No.	%
From Purchasing Shop	47084	65.17
Extension Service	6332	8.76
Neighboring Farmers	3464	4.79
Friends	2323	3.22
Relatives	1645	2.28
Own Experience	15028	20.80
Other	802	1.11
Total	72246	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, lack of money is reported by majority of HH 49.96 percentage and non-availability in time was reported by 39.93 percent households.

Table2.16: HH reporting reasons for low use of fertilizers/pesticides

Reason	HH	
	No.	%
Not available	22170	39.93
No money	27740	49.96
Other	5612	10.11
Total	55522	100.00

Source: Annex Table 52

About the existence of advice on safe use of fertilizer and pesticides, 44.82 percent of households reported its existence.

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

Response	HH	
	No.	%
Yes	73429	44.82
No	90409	55.18
Total	163838	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 67.61 percent of the households have held livestock.

Table 2.18: Frequency and percentages of households raising livestock

Response	HH	
	No.	%
Yes	110767	67.61
No	53069	32.39
Total	163836	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, goats, and pigs. Among all kinds of livestock raising, majority (60.47%) of the HH have raised buffalo followed by goat (43.91%), cattle (36.26%) and pig (1.87%).

Table2.197: Types of breeds of livestock owned

Animal	Type	HH (%)	HH	Animal (no.)	Mean (Animal/HH)
Cattle	Local	26.12	28932	49035	1.69
	Improved	10.14	11234	58929	5.25
Buffalo	Local	51.40	56929	103765	1.82
	Improved	9.07	10044	30379	3.02
Goat	Local	39.34	43579	177683	4.08

	Improved	4.57	5067	655993	129.46
Pig	Local	1.87	2067	8812	4.26
Total		n=110767			

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 91.92 percent of the HH have reared their livestock in the shed separately. Very insignificant proportion of the population has reared in the residential house.

Table 2.20: Place of housing of livestock

Place of housing livestock	HH	
	No.	%
In the shed separately	101814	91.92
In the residential house	5785	5.22
Both	3165	2.86
Total	110764	100.00

Source: Annex Table 56

3.13 Milk and Milk Products

Among those HH who have raised livestock, 43.61 percent have reported that they sell milk and milk products. The amount of milk sold per annum was found to be 1756 litres per household

Table 2.21: Milk and milk products production and sale

Response	HH		Average milk sold/year (litre)/HH
	No.	%	
Yes	48307	43.61	1756.00
No	62457	56.39	-
Total	110764	100.000	

Source: Annex Table 57 and 58

Large percentage (70.38) of the HH sold their milk in collection centers followed by 21.70 percent at home, whereas 2.55 percent HH sold milk in hotels.

Table 2.22: HH selling milk at different places

Different Place to sell Milk	HH	
	No.	%
Home	9713	21.70
Collection center	31502	70.38
Village	1265	2.83
Neighbor	760	1.70
District headquarter	0	0.00
Hotel	1141	2.55
Others	380	0.85
Total	44761	100.00

Source: Annex Table 59

3.14 Feeds and feeding

Regarding the type of feeding for the livestock, stall feeding was practiced by 57.76 percent household while feeding in pasture land was reported by 4.88 percent. Stall feeding as well as feeding in pasture land both was reported by 37.36 percent households.

Table 2.23: HH with different type of feeding

Type of feeding	HH	
	No.	%
Stall feeding	63974	57.76
Feeding in pasture land	5405	4.88
Both	41386	37.36
Total	110765	100.00

Source: Annex Table 60

Regarding the type of feeds given to the livestock, mixed feed were fed by 63.12 percent of HH. Fodder/straw also constituted major portion of livestock feed as it was fed by 32.99 percent of households followed by 29.86 percent who fed green grasses.

Table 2.24: Livestock feeds and feeding types

Types of Feeds	HH	
	No.	(%)
Fodder/straw	32949	32.99
Green Grasses	29824	29.86
Forage	16474	16.50
Concentrates	17954	17.98
Mixed	63038	63.12
Other	760	0.76
Total	99872	100.00

Source: Annex Table 61

3.15 Poultry

Poultry was raised by only 18.01 percent of the households in the district.

Table 2.25: Households raising poultry

Rearing of poultry	HH	
	No.	%
Yes	29500	18.01
No	134333	81.99
Total	163833	100.00

Source: Annex Table 62

Of the total birds, local birds were raised by 5.44 to 69.24 percent of household less than 5.3 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 575.37 and improved layer 2000 per farm. On the other hand, the average number of local chicks and local cocks is found to be 4.59 and 4.82 respectively. Similarly, the average number of ducks per HH was found to be 3.41 for local cock and 3.07 for local hen and around 8 in case of pigeon.

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

Type of birds	Nos of HHs	HH (%)	Sum	Mean
Poultry				
Local Chick	13590	46.07	62403	4.59
Local Cock	18318	62.10	88218	4.82
Local Hen	20426	69.24	84639	4.14
Local dry	1604	5.44	64421	40.17
Improved Broiler	802	2.72	461347	575.37
Improved Layer	760	2.58	1520960	2000.00
Duck				

Local Chick	2281	7.73	7225	3.17
Local Cock	3083	10.45	10515	3.41
Local Hen	3505	11.88	10763	3.07
Local Dry				
Pigeon				
Local Chick	380	1.29	2662	7.00
Local Cock	1141	3.87	9126	8.00
Local Hen	1141	3.87	9126	8.00
Total	n=29500			

Source: Annex Table 64

3.16 Fishery

As the nature of the district is plains terai, fishery is one of the familiar components of agriculture, also the source of income too, the share of households in this field is found to be 7225 households with average area of 6.2 ha of pond area. Average quantity of fish sold was accounted 1244.44 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)
7225	2	6.2	1244.44

Source: Annex Table 67

3.17 Forest

As regards to the HH involving in forest land, a total of 24865 HH (51.22%) of the HH involving in community forest with the average holding 394.38 ha /HH. Similarly, households involving in compact forest, scatter forest and NTFP Area are 20.18, 12.26 and 8.17 percent with the average holding 0.59, 0.58 and 0.68 ha /HH.

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	9795	20.18	5745	0.59
Scatter Forest	5952	12.26	3463.51	0.58
NTFP Area	3968	8.17	2703.03	0.68
Community Forestry	24865	51.22	9806115.69	394.38
Other Forest Area	3968	8.17	3463.51	0.87
Total	48548			

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 92.63 percent of the HH out of 163834 households. In case of climatic hazards, 99.23 percent of the HH who have experienced climate change reported extreme high temperature which is followed by experience on *drought* (91.47%), *hail storm* (72%), *extreme cold* (68.46%), *extreme frost* (53.46%) and *flood hazard* (23.19%).

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

Experiencing climate change	HH	
	No.	%
Climate change	151761	92.63
Experiencing Climatic Hazards		
Hail Storm	106923	72.00
Extreme high temperature	147370	99.23
Extreme cold	101674	68.46
Extreme Frost	79388	53.46
Floods	34445	23.19
Drought	135838	91.47
Others	26212	17.65
Total	148510	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 79686 households who got support, 80.71 percent reporting family support as main support followed by their own saving 45.36 and support from friend/relative 25.59 percent. Support either from government or from INGO was reported by 11.71 percent of the households.

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

Agencies	HH	
	No.	%
Government support	6167	7.74
Family support	64311	80.71
INGO	3166	3.97

Saving	36148	45.36
Asset	7812	9.80
Friend/relative	20393	25.59
Others	802	1.01
Total	79686	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 majority 74.97 percent households protect their lives at the time of occurrence of hazards followed by protect their agriculture 52.85 percent and protect their household goods 36.90 percent.

Table 3.3: Households taking measures to mitigate climatic hazards

Measures	HH	
	No.	%
Protect lives	41099	74.97
Protect household goods	20227	36.90
Protect agriculture	28973	52.85
Protect livestock	15458	28.20
Protect others	2827	5.16
Total	54821	100.00

Source: Annex Table 70

4.2 Experience on different types Climatic Extremes in different Seasons

During last 15 years, 90.49% HH reported experiencing change in climate.

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

Response	HH	
	No.	%
Yes	148257	90.49
No	15580	9.51
Total	163837	100.00

Source: Annex Table 71

Among HH who had experienced change in climate, 63.14% of the HH reported low rainfall during rainy season while 52.59% reported high rainfall. Frequent floods and droughts were reported by 29.42% and 83.17% HH and more frost was reported by 6.52% HH in rainy season. Increased temperature was reported by 93.93, 82.88, and 15.36% HH during dry, rainy and winter season while 71.45% reported decrease in water table in dry season. Frequent hail storm was reported by 38.37% of the HH during dry season. During winter season, 64.72% HH reported experiencing extreme cold.

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	124274	83.82	93606	63.14	66212	44.66	145551	98.17
More overall rainfall	20988	14.16	77966	52.59	44241	29.84	121571	82.00
More frequent drought	133821	90.26	123298	83.17	72635	48.99	146270	98.66
More frequent flood	6968	4.70	43613	29.42	9671	6.52	56028	37.79
Strong wind	127771	86.18	72652	49.00	32263	21.76	142848	96.35
More cold spells or foggy days	12160	8.20	9671	6.52	95945	64.72	107345	72.40
Higher temperature	139260	93.93	122877	82.88	22765	15.36	144369	97.38
Frequent hailstorm	56880	38.37	55615	37.51	23815	16.06	93284	62.92

Lower ground water table	105931	71.45	52441	35.37	71197	48.02	127093	85.72
Total	n= 148257							

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 41.06 percent of the HH in the district.

Table 3.6: Households reporting receipt of early warning messages

Response	HH	
	No.	%
Yes	67268	41.06
No	96562	58.94
Total	163830	100.00

Source: Annex Table 73

Among various sources of early warning messages (such as telephone, Radio/TV, siren, Bulletin/Newspaper), Majority of HHs (97.59%) have reported about the early warning was received from Radio/TV followed by bulletin/newspaper (35.11%) and hand mike (3.43%)

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

Sources	HH	
	No.	%
Telephone	1265	1.90
Radio/TV	64906	97.59
Siren	760	1.14
Colorful flag	760	1.14
Hand mike	2281	3.43
Bulletin/newspaper	23352	35.11
Others	1943	2.92
Total	66510	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, 93.36 percent of HH preferred FM radio/TV, siren (86.61%), SMS on mobile (80.73%), and telephone (77.84%) as medium for delivery of early information . Likewise digital display board and newspaper are preferred by 52.90 percent and 48.93 percent of HH respectively.

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

Medium for delivery of Early information	HH	
	No.	%
Telephone	126348	77.84
SMS on mobile	131035	80.73
Siren	140575	86.61
FM Radio/TV	151544	93.36
Newspaper	79422	48.93
Digital display board	85870	52.90

Internet	54474	33.56
Others	4348	2.68
Total	162315	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 45.09 percent of the households followed by agro vets (34.37%) and Agriculture/Livestock Sub Center (12.71%).

Table 3.9: Priority of location suitable for Digital Display Board

Location	HH	
	No.	%
DADO/DLSO offices	71906	45.09
Agriculture/Livestock Sub Center	20268	12.71
VDC/DDC offices	5149	3.23
Markets	5826	3.65
Agro Vet	54813	34.37
Other place	1520	0.95
Total	159482	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 19.16 percent of the HH are found to have received agro advisory service during the last 12 months (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, 92.48 percent of the HH have preferred mobile service, 81.70 percent toll free, 77.03 percent telephone, 57.26 percent newspaper/bulletin and 49.35 percent digital display board.

Table 3.10: HH preferring advisory services by type

Types of advisory	HH	
	No.	%
Mobile service	145807	92.48
Telephone	121455	77.03
Newspaper/Bulletin	90283	57.26
Toll free	128820	81.70
Internet service	65666	41.65
Digital display board	77810	49.35
Others	5993	3.80
Total	157669	100.00

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 13.92 percent of the households regularly listened. Only 12.37 percent of the household reported watching agricultural program in television and 24.43 percent of the HH read newspapers and magazines (annex Tables 80, 81 and 82)

Annex 1**Average maximum and minimum temperature and rainfall**

Month	Maximum temperature (°C)	Minimum temperature (°C)	Rainfall (mm)	No. of Rainy days
January	22.4	8.7	16.4	3
February	25.4	10	15.4	3
March	30.8	13.5	17	2
April	35.5	18.4	21	3
May	35.9	22.9	79	7
June	34.9	25	270.2	12
July	32.5	25.6	543.1	17
August	32.7	25.7	364.7	17
September	32.1	24.4	273.2	13
October	31.7	20.1	67.1	4
November	28.9	14.2	7.5	2
December	25	10.4	17.1	2