
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

Mahottari, a terai district, is one of the 25 pilot districts of Building Resilience to Climate Related Hazards Project (BRCH), situated in Janakpur zone of Central Development Region (CDR). Geographically, the district is located in the latitude of 26° 36' to 28° 10' N and the longitude of 85°41' to 85°507' E (Figure 1). The head-quarter of the district is Jaleswar municipality. The district is bordered by Dhanusha district on the east, Sarlahi on the west, Sindhuli in the north, and Indian state of (Bihar) on the south.

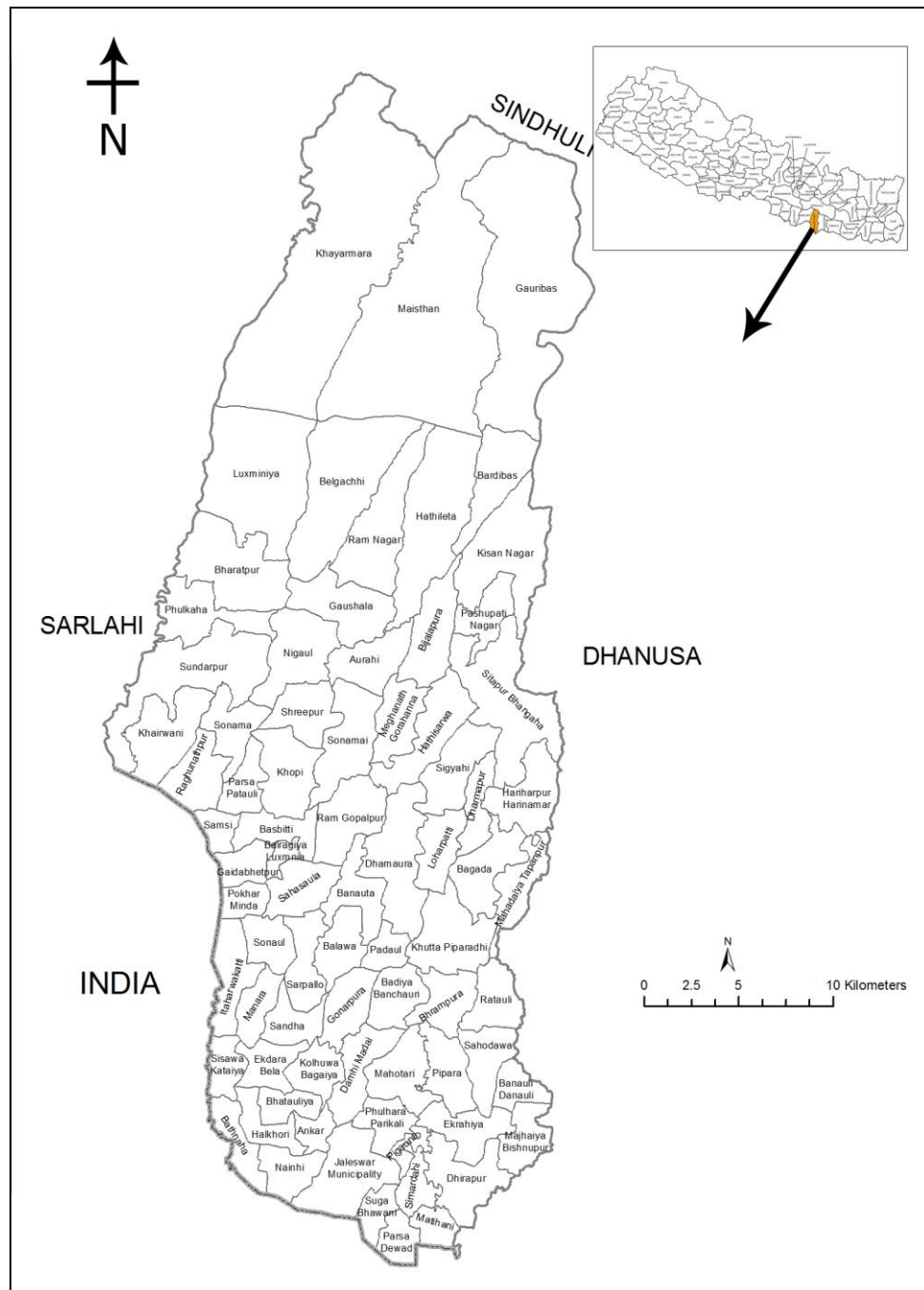


Figure 1: Location Map of Mahottari District

The topography of the district is almost same as other Terai districts. Most part of Mahottari lies on flat Terai region among which 86% of its area is under Lower tropical region having altitude below 1000 feet. Similarly 14% of its area lies in between 1000 to 3000 ft. called Upper Tropical region or Siwalik range. The variation of altitude is in between 61 meter to 808 meter. The total area of the district was 1,002 sq. km. The population of the district consists of 6, 27,580 with 3, 11016 male and 3, 16,564 female with 1, 11,298 HHs of 2011 census. The share of population is only 2.39% of the total population with a density of 626 persons/sq.km., which is more than national population density of 181 persons/sq. km. as of 2011 census.

1.2 Land Utilization

The total area of the district is (1002 km²) 1, 00200ha with total cultivated land area of 69,238 ha (DADO, 2014). Among total land of Mahottari 69.1% of land is used for Agriculture, 23.5% of land is occupied by forest, 1.20% of land is occupied by water resources and 4.70% of land is barren land.

1.3 Climate and Rainfall

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

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

Upper tropical: Areas located at altitudes of between 300 to 800 msl consisted of this type of climate, where summer is also hot and winter is cool. Plenty of agricultural land is available in this area also. Besides agricultural land this area has forest land it also consists of small hills of Siwalik range.

As Mahottari lies in tropical region it is mostly affected by monsoon effect. High temperature up to 42 degree Celsius can be observed during summer time whereas minimum temperature of 5 degree Celsius occurs during winter time. Minimum rainfall occurs in winter season and 80% of total rainfall occurs during April to September. Average annual rain fall varies in between 1840 mm to 2200mm.

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)	98.2	129.7
Dependency ratio		54.6
Household (HH) size	5.64	6.1
Percent of female headed households	19.41	10.68
HH (%) who own their housing unit	98.12	99.28
HH (%) with piped drinking water	14.08	18.28
HH (%) with access to electricity	63.19	97.11
HH (%) with access to Telephone/Mobile	53.15	75.24
HH (%) with toilet	27.51	62.73
HH (%) using firewood for cooking	56.35	46.31
Literacy rate	47.0	94.39

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 56.48 percent is higher than 43.52 percent of female population giving sex ratio of 129.7 in the district. About 27.67 percent of population were under 15 years and 7.65 percent were of 60 years or more old. Thus majority of population (64.68%) were from age group 15-59 years (Table 1.2). The survey data revealed that the overall dependency ratio is 54.6 percent. Regarding the HH size, the average HH size of the district is found to be 6.1 compared to 5.64 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	26695	3.93	15622	2.30	42317	6.23%
5-9 Years	40560	5.97	31688	4.66	72248	10.63%
10-14 Years	37863	5.57	35588	5.24	73451	10.81%
15-19 Years	45055	6.63	24459	3.60	69514	10.23%
20-24 Years	40181	5.91	24667	3.63	64848	9.54%
25-29 Years	30978	4.56	29430	4.33	60408	8.89%
30-34 Years	31725	4.67	28780	4.24	60505	8.90%
35-39 Years	26964	3.97	22639	3.33	49603	7.30%
40-44 Years	19638	2.89	19199	2.83	38837	5.72%
45-49 Years	17439	2.57	15353	2.26	32792	4.83%
50-54 Years	14341	2.11	16693	2.46	31034	4.57%
55-59 Years	17651	2.60	14338	2.11	31989	4.71%
60-64 Years	15796	2.32	7649	1.13	23445	3.45%
65+ Years	18892	2.78	9639	1.42	28531	4.20%
Total	383778	56.48	295744	43.52	679522	100.00%

Source: Annex Table 1

2.2 Household head and members

Son/daughter constituted largest percentage (39.1%) of household members followed by household heads which constituted 16.38 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	99420	14.63	11873	1.75	111293	16.38
Husband/wife	11722	1.72	92725	13.65	104447	15.37
Son/daughter	198041	29.14	67638	9.95	265679	39.10
Grand children	52225	7.69	38916	5.73	91141	13.41
Son/daughter in law	3424	0.50	68539	10.09	71963	10.59
Daughter/son in law	268	0.04	268	0.04	536	0.08
Parent	6903	1.02	9102	1.34	16005	2.36
Father/mother in law	268	0.04	0	0.00	268	0.04
Brother/sister in law	6158	0.91	3215	0.47	9373	1.38
Household widow		0.00		0.00		0.00
Others	5353	0.79	3481	0.51	8834	1.30
Total	383782	56.48	295757	43.52	679539	100.00

Source: Annex Table 2

From the Table 1.3, it is seen that out of 16.38 percent household heads, female formed 1.75 percent of heads in comparison to 14.63 percent of male members who were household heads thus giving overall female household head percentage as 10.68 percent.

2.3 Marital Status of head of households

A total of 64.69 percent of HH members were married. Widow members of the household constituted 3.43 percent of the population. A total of 32.72 percent of population were married male whereas married female population accounted for 31.97 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	184863	32.72	180642	31.97	365505	64.69
Divorced	1072	0.19	0	0.00	1072	0.19
Separate	268	0.05	536	0.09	804	0.14
Widow/widower	10592	1.87	8777	1.55	19369	3.43
Unmarried	119731	21.19	58498	10.35	178229	31.55
Total	316526	56.02	248453	43.98	564979	100.00

Source: Annex Table 3

Male gender had higher percentage of widow (1.87%) than female gender (1.55%). Unmarried male constituted more (21.19%) of total population than unmarried female (10.35%).

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 94.39 percent compared to 47 percent in 2011 census showing that the literacy rate has been increased over the period of time. As regards to the educational status, the share of can read and write is high at 29.72 percent, is followed by primary level (20.92%), lower secondary (12.63%), secondary (9.17%), SLC/equivalent (7.4%) and inter/equivalent (5.97%). People having graduated and above graduate level are still found to have quite low at 4.96 percent. Following tables presents the educational status of the population of the district.

Table 1.5 Percentage of population by education level and gender

Education Level	Gender				Total	
	Male		Female		No.	%
	No.	%	No.	%		
Cannot read and write	15202	2.39	20536	3.22	35738	5.61
Can read and write	79763	12.52	109596	17.20	189359	29.72
Beginners	10918	1.71	12198	1.91	23116	3.63
Primary (1-5)	80413	12.62	52876	8.30	133289	20.92
L. Secondary (6-8)	51175	8.03	29277	4.59	80452	12.63
Secondary (9-10)	39814	6.25	18625	2.92	58439	9.17
SLC/Equivalent	32566	5.11	14608	2.29	47174	7.40
Inter/Equivalent	24916	3.91	13099	2.06	38015	5.97
Grad/Equivalent	14343	2.25	4494	0.71	18837	2.96
PG/Equi/above	7974	1.25	4819	0.76	12793	2.01
Total	357084	56.04	280128	43.96	637212	100.00

Source: Annex Table 4

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

Currently 28.91 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 female than male, which constituted 27.44 percent and 16.85 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	107377	16.85	76857	27.44	184234	28.91
No	249713	39.19	203280	72.56	452993	71.09
Total	357090	56.04	280137	100.00	637227	100.00

As regards to the accessibility to educational institutions in terms of time, 81.79 percent of the respondents have reported that distance to reach is less than 1 km, whereas 7.45 percent reported distance of 1-5 km and only 2.76 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	83778	45.47	66915	36.32	150693	81.79
1-5 km	8873	4.82	4856	2.64	13729	7.45
5-10 km	4284	2.33	803	0.44	5087	2.76
Greater than 10 km	10441	5.67	4283	2.32	14724	7.99
Total	107376	58.28	76857	41.72	184233	100.00

Source: Annex Table 6

Accessibility to educational institution by gender shows that 92.21 percent of the respondents have reported that institutions can be reached within less than 1 hour (Table 1.8). Also comparatively higher male (2.91%) than female (0.58%) 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	96722	52.50	73168	39.71	169890	92.21
1-2 hours	5297	2.88	2620	1.42	7917	4.30
More than 2 hours	5355	2.91	1071	0.58	6426	3.49
Total	107374	58.28	76859	41.72	184233	100.00

Source: Annex Table 7

Regarding mode of transport, 86.70 percent of the population reported travelling on foot for educational institution, 6.47 percent using bicycle and 5.38 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	91331	85.06	68405	37.13	159736	86.70
Bus	6693	6.23	3213	1.74	9906	5.38
Bicycle	7744	7.21	4169	2.26	11913	6.47
Foot and bus	804	0.75	804	0.44	1608	0.87
Other	804	0.75	268	0.15	1072	0.58
Total	107376	100.00	76859	41.72	184235	100.00

Source: Annex Table 8

2.6 Occupation

As revealed from the table 1.10, among various types of occupations adopted by the people, 28.64 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 28.64 percent of the population. Household work as their occupation accounting for 21.28 percent is followed by student as their occupation accounting for 20.96 percent. About 12.73 percent of the population was engaged in external jobs in abroad, is followed by non-agricultural salaried work accounting for 4.70 percent. Occupational pattern is more or less same in case of male and female except in case of salaried non agriculture occupation and abroad external job where female participation is quite low i.e. only 1.78 and 0.80 percent in comparison to 6.58 and 11.93 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	100340	17.76	61484	10.88	161824	28.64
Salaried/wage agriculture	6635	1.17	3748	0.66	10383	1.84
Non agriculture salary	37196	6.58	10057	1.78	47253	8.36
Own enterprises	11339	2.01	3748	0.66	15087	2.67
Abroad external job	67409	11.93	4494	0.80	71903	12.73
Household work	9562	1.69	110645	19.58	120207	21.28
Student	70299	12.44	48115	8.52	118414	20.96
No work	11873	2.10	3749	0.66	15622	2.77
Other	1875	0.33	2411	0.43	4286	0.76
Total	316528	56.02	248451	43.98	564979	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 45.29 percent of the households, followed by 8.40 percent for education/training purpose and 3.25% for easier lifestyle.

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

Reason for Migration	HH	
	No	%
Family reason	803	0.57
Education/training	11780	8.40
Natural disaster	803	0.57
Looking for work	63487	45.29
Easier lifestyle	4551	3.25
No migration	57962	41.35
Other reason	803	0.57
Total	140191	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, 7.84 percent of the population are associated with saving and credit cooperative followed by vegetable group (4.58%) and seed production group (4.27%). Association with the institutions such as, agriculture marketing group, farmers field school and water users group are 3.99, 3.11 and 3.10 percent. However, other than the above mentioned institutions, their associations in category 'others' are found to be very high at 15.30 percent.

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

Types of organizations	Gender				Total	
	Male		Female		Total	
	No.	%	No.	%	No.	%
Farmers Field School	10384	1.84	7170	1.27	17554	3.11
Vegetable	13116	2.32	12735	2.25	25851	4.58
Water Users Group	13212	2.34	4285	0.76	17497	3.10
Commercial Crop Production	10954	1.94	3749	0.66	14703	2.60
Saving credit co-operative	27404	4.85	16903	2.99	44307	7.84
Agricultural co-op group	5028	0.89	1339	0.24	6367	1.13
Agriculture marketing	12525	2.22	10002	1.77	22527	3.99
Seed production	13327	2.36	10803	1.91	24130	4.27

Other	35089	6.21	51365	9.09	86454	15.30
Not in Group	175475	31.06	130097	23.03	305572	54.09
Total	316514	56.02	248448	43.98	564962	100.00

Source: Annex Table 10

2.9 Ethnicity

As per the table 1.13, the distribution of population by ethnicity revealed that majority of the population residing in the district constituted Madhesi, which accounted for 40.20 percent of the total population, followed by Brahmin/Chhetri (19.80%), Adibasi/Janajati (8.30%) and Dalit (2.25%).

Table 1.13: Distribution of population by ethnicity

Ethnicity	Gender				Total	
	Male		Female		No.	%
	No.	%	No.	%		
Adibasi/Janajati	32889	4.84	23500	3.46	56389	8.30
Brahman/Chhetri	71769	10.56	62781	9.24	134550	19.80
Dalit	8566	1.26	6692	0.98	15258	2.25
Madhesi	155915	22.94	117267	17.26	273182	40.20
Others	114643	16.87	85520	12.58	200163	29.46
Total	383782	56.48	295760	43.52	679542	100.00

Source: Annex Table 11

2.10 Housing Ownership

Regarding the ownership of the houses, almost all the HH (99.28%) reported that they have their own houses. Very insignificant number of HH is found to have rented or lived in relative's house or lived in land owner's house

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

Types of house ownership	HH	
	No.	%
Own house	110500	99.28
Rented house	536	0.48
Relative's house	0	0.00
Land owner's house (included in rented land)	268	0.24
Institutional house	0	0.00
Total	111304	100.00

Source: Annex Table 13

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

Among those, who have owned house, majority (54.33%) of the HH were found to have lived in Semi-pakki houses, 29.17 percent in concrete roof/Pakki houses and only 16.25 percent of the respondents are found to have lived in Kacchi/Thatch roofed houses.

Table 1.152: Distribution of houses by types of houses

Type of residential house	HH	
	No.	%
Concrete roof/pakki/cemented	32468	29.17
Semi-pakki (tin/tile/slate roof)	60468	54.33

Kacchi- thatched roof	18087	16.25
Others	268	0.24
Total	111291	100.00

Source: Annex Table 14

2.11 Households Asset

The most common assets owned by the people are found to be assets including jewellery reportedly constituting 28.60 percent of household items followed by fan/heater, telephones/mobile phones, cycles, TV and radio/ cd player constituting 22.49, 16.86, 10.56, 8.84 and 5.23 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 (44.38%) portion of the net value of the all the assets owned by the households followed by motorcycle/scooter, tractor/power tiller, TV and telephone/mobile constituting 19.65, 17.63, 4.86 and 3.43 percent portion of the net value of the assets. Insignificant proportion of the net value was represented by the assets like refrigerators, washing machine, sewing machine etc.

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

Types of assets	Items		Approximate current value	
	No.	%	(Rs)	%
Radio/ cd player	49222	5.23	44291276	0.30
Cycles	99401	10.56	213378104	1.44
Motorcycle/scooter	34727	3.69	2914436305	19.65
Car/jeep	535	0.06	508687000	3.43
Bus/truck	268	0.03	66932500	0.45
Telephone/mobile	158722	16.86	538073376	3.63
Washing machine	0	0.00	0	0.00
Refrigerator	4704	0.50	86857350	0.59
Sewing machine	18301	1.94	97377756	0.66
Fan/heater	211708	22.49	404611733	2.73
TV	83184	8.84	720787179	4.86
Assets including Jewelries	269137	28.60	6583085723	44.38
Tractor/power tiller	9906	1.05	2615722100	17.63
Thresher/pump set/sprayers	267.73	0.03	4015950	0.03
Mill/Ghatta/turbine	535	0.06	29450300	0.20
Others	535	0.06	6693250	0.05
Total	941155	100.00	14834399903	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, only 11.49% have reported they have food sufficiency for 12 or more months. A total of 28.18% of the HH have reported that food is sufficient for 9 to 12 months and majority of household reported that food sufficient for less than 9 months indicating that the district was in food surplus level.

Table 1.173: Food sufficiency of the HH by duration

Food sufficiency level	HH	
	No.	%
Less than 3 months	17116	15.38
3 to less than 6 months	34516	31.01
6 to less than 9 months	15508	13.93
9 to less than 12 months	31362	28.18
12 months or surplus	12793	11.49

Total	111295	100.00
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Source: Annex Table 16

2.13 Source of Energy

As regards to the source of energy for lighting, almost all the households (97.11%) have electricity, 1.69 percent households have used kerosene for lighting, and insignificant percent have used biogas for lighting.

Among various sources of energy for cooking, firewood remained a main fuel for cooking, accounting for 46.31% of the total HH. About 37.70% and 10.81% of the HH have used cow dung cake and gas cylinder for cooking.

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

Purpose	Main source of energy	HH	
		No.	%
Light	Electricity	108088	97.11
	Biogas	1071	0.96
	Solar	0	0.00
	Kerosene	1876	1.69
	Other	268	0.24
	Total	111303	100.00
Cooking fuel	Timber/ firewood	51535	46.31
	Cow dung cake	41955	37.70
	Straw/ dry grass/ eaves/rubbish	4437	3.99
	Cylinder gas	12028	10.81
	Biogas	1338	1.20
	Kerosene	0	0.00
	Other	0	0.00
	Total	111293	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 73.78% of the HH followed by piped water (18.28%). Thus it can be inferred that still substantial percent of households have no access to safe drinking water.

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

Source	HH	
	No	%
Piped water	20348	18.28
Covered well	2677	2.41
Hand pump/tube-well	82116	73.78
Open well	2410	2.17
Spring water	536	0.48
River	268	0.24
Other	2945	2.65
Total	111300	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 (62.73%) have access to toilet in their HH. About 37.01% of the HH have reported that they have toilet with flush (connected to safety tank) followed by toilet without flush 24.52%. Very insignificant percentage (0.96%) of people have toilet with flush connected to sewer and 37.27% of HHs reported no toilet.

Table 1.20: Distribution of HH using different type of toilets

Types of toilet used	HH	
	No.	%
Toilet with flush (connected to sewer)	1071	0.96
Toilet with flush (connected to safety tank)	41190	37.01
Toilet without flush	27288	24.52
Public toilet	268	0.24
No toilet	41478	37.27
Total	111295	100.00

Source: Annex Table 20

2.16 Households Consulting Health Institutions

There are various kinds of health institutions prevailing in the district. Among all, private hospitals cater substantial percentage of households (34.14%), which is followed by government's district hospital (29.84%), government health post/centers (17.46%) and private pharmacy/clinic (13.56%). other privates and government other institutions providing services for 3.13% and 1.39% of HHs. Ayurveda and mobile centers center were cited by none and negligible portion of the households.

Table 1.21: Distribution of HH consulting different health institutions

Health service provider	HH	
	No.	%
Government health post/PHC	19428	17.46
Government district hospital	33216	29.84
Government mobile clinic	268	0.24
Government Ayurveda center	0	0.00
Government other institution	1549	1.39
Private hospital	37998	34.14
Private pharmacy/clinic	15088	13.56
Private health worker's home	268	0.24
Private others	3482	3.13
Total	111297	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 27.59% followed by 15.87% expenses on education, 14.68% on health and 11.67% in apparel and personal items.

Table 1.22: Expenditure distribution of HH by different items

Items of expenditure	HH (No).	Total expenditure	Average
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		Rs	%	expenditure/HH (Rs)
Food	111296	5327684268	27.59	47871
Fuel	58363	891869844	4.62	8014
Apparel and personal items	108676	2252620010	11.67	20240
Social and religious activities/donation/charity	107070	1174197744	6.08	10551
Insurances and taxes	30234	287750199	1.49	2586
Repair and maintenance of house, vehicles, equipment	74484	852345286	4.41	7659
Transportation	105406	774679081	4.01	6961
Newspaper/communication	97374	556070883	2.88	4996
Disaster related expenses	8510	69571075	0.36	625
Input cost for agriculture/livestock/other enterprises	39451	899524153	4.66	8082
Health	105138	2835063430	14.68	25474
Education	76779	3064404932	15.87	27535
Cash losses	2677	241811731	1.25	2173
Other	6216	82324290	0.43	740
Total	n=111293	19309916926	100.00	173505

Source: Annex Table 22

As regards to the income of the HH in the district, remittances was found to be major contributor to total annual income, which accounted for 46.10 percent followed by nonagricultural wages/salary (36.01%), and sale of agricultural products (22.75%). Sale of milk and milk product come to be fourth position with contribution of 15.05 percent of the income. Combining the income from different heading as given in the following table the average income is found to Rs. 275484.

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	4819	480307620	4.33	4316
Nonagricultural wages/salary	40082	7755862017	36.01	69689
Sale of agricultural products	25319	2758031865	22.75	24782
Livestock/fisheries sale	13329	838490520	11.98	7534
Milk and milk product sale	16752	666924519	15.05	5993
Remittances	51307	13197743405	46.10	118586
Occupational work (tailoring, black smithy, carpentry etc)	1817	476235920	1.63	4279
Forestry related products sale	1339	194639710	1.20	1749
Pension	535	80319000	0.48	722
Own enterprise	14227	3552898250	12.78	31924
Others	4016	658002966	3.61	5912
Total	n=111293	30659455792	100.00	275484

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.101979 per household.

2.18 Credit Situation

Credit is one of the important economic indicators, which is taken either to sustain the present status of life or to invest on something else in order to take benefit from the investment. In this regards, a total of 46.29 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	51519	46.29
No	59778	53.71
Total	111297	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 95.91 percent of the households have reported that there is presence of climate and weather related risks on crops and livestock production.

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

Possibility of risks on crop/livestock	HH	
	No.	%
Yes	106749	95.91
No	4552	4.09
Total	111301	100.00

Source: Annex Table 25

Among the households reporting presence of climate and weather related risks, the risk of diseases and pests in cereals and vegetable was found to be from 40.53 to 62.85 percent. Similarly drought was reported by 30.62 percent to 40.15 percent households as risk in cereals and vegetable. Risk of flood on rice was reported by 12.32 percent of households while risks due to hailstone on wheat, maize and potato were reported by 15.90, 15.15, and 13.61 percent of households respectively.

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

Crop/ livestock	No of HHs and %	Risks in crops and livestock due to climatic hazards						
		Disease pest	Drought	Flood	Hail stone	All	Others	Total
Rice	No of HHs	99248	92460	30176	20290	2410	268	244851
	%	40.53	37.76	12.32	8.29	0.98	0.11	100.00
Wheat	No of HHs	94161	77162	2620	33026	535	268	207772
	%	45.32	37.14	1.26	15.90	0.26	0.13	100.00
Maize	No of HHs	15261	14190	535	5355			35340
	%	43.18	40.15	1.52	15.15	0.00	0.00	100.00
Mustard	No of HHs	2620	1549					4169
	%	62.85	37.15	0.00	0.00	0.00	0.00	100.00
Vegetable	No of HHs	7592	5833	478	1071			14973
	%	50.70	38.95	3.19	7.15	0.00	0.00	100.00
Potato	No of HHs	8510	4819	268	2142			15739
	%	54.07	30.62	1.70	13.61	0.00	0.00	100.00
Cow	No of HHs	13214	268					13482
	%	98.01	1.99	0.00	0.00	0.00	0.00	100.00

Buffalo	No of HHs	4819	268			535		5622
	%	85.71	4.76	0.00	0.00	9.52	0.00	100.00
Goat	No of HHs	14132	268		268	1339		16006
	%	88.29	1.67	0.00	1.67	8.36	0.00	100.00
Chicken	No of HHs	4551			268	535		5355
	%	85.00	0.00	0.00	5.00	10.00	0.00	100.00
Duck	No of HHs	535	0	0	0	0	0	535
	%	100	0	0	0	0	0	100
Other	No of HHs	5890	4016	268	268			10441
	%	56.41	38.46	2.56	2.56	0.00	0.00	100.00
Total	No of HHs	270533	200831	34345	62686	5355	535	574285
	%	47.11	34.97	5.98	10.92	0.93	0.09	100.00

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

Regarding the risk on livestock species, all species are reported to be vulnerable to risks of diseases and pests as well as risk of drought to some extent. As 98.01 percent of the household have reported that cow was more prone to risks due to diseases and pests followed by goat (88.29%), buffalo (85.71%) and chicken (85%). Drought effects were reported by 4.76 percent in buffalo followed by 1.99% in cow and 1.67% in goat.

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 2.35% of the HH are found to have known about it.

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

Knowledge on crop/ livestock insurance	HH	
	No.	%
Yes	2620	2.35
No	108682	97.65
Total	111302	100.00

Source: Annex Table 27

Among the household who have knowledge on crop/livestock insurance only 268 HH (9.28%) of household has insurance their livestock.

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

Insuring of crop/livestock in last year	HH	
	No.	%
Yes	268	9.28
No	2620	90.72
Total	2888	100.00

Source: Annex Table 28

2.20 Reasons for Non-Insuring

Though there were so many types of hazards likely to occur due to climate change in crops and livestock, none of the HH are found to have insured their crops and livestock. Some people might not be willing to insure and pay the premium and some people might not know about insurance and its policy. However, an enquiry on it revealed that out of 1549 respondent all cited lack of information as the major reason for non-insuring.

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

Reason for not doing insurance	HH	
	No.	%

Lack of information	1549	100.00
High premium rate	0	00
No access to the service	0	00
Poor insurance service	0	00
Problem in getting back the insured amount	0	00
Others	0	00
Total	1549	100.00

Source: Annex Table 29

TV/Radio, newspaper and ASCs/LSCs were reported as major sources of information on agriculture insurance reported by 100, 50 and 50 percent of the respondents.

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

Source	HH	
	No.	%
Insurance agent	0	0.00
DADOs/DLSOs	0	0.00
Newspaper	268	50.00
TV/Radio	535	100.00
ASCs/LSCs	268	50.00
Leader farmer/Neighbor/Relatives	0	0.00
Other	0	0.00
Total	535	100.00

Source: Annex Table 32

Out of 1818 households, only 536 (29.48%) reported having knowledge about 75 percent subsidy on agriculture insurance.

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

Response	HH	
	No.	%
Yes	536	29.48
No	1282	70.52
Total	1818	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 (94.62%) in the district have owned their land.

3.2 Use of Land by Type

Usually in Nepal, land use in general can be classified into six categories viz. (i) Temporary crops (ii) Temporary meadow (iii) Temporary fallow (iv) Permanent crops (v) Permanent meadow and (vi) Appropriate for forest and (vii) Appropriate for fishery. Temporary crop was grown with average area of 0.9488 ha/HH and overall irrigated land is 0.3620 ha/HH with average number of parcel land is 4.34. Use of temporary fallow is also very low with average area 0.0082 ha/HH. Except for temporary crop, the use of land for permanent crops is slightly less, the average area covered is 0.0336 ha/HH with average irrigated area of 0.0006 ha. The land use for permanent meadow is also very low, the average area of which is 0.0028. Average land appropriate for forest and fishery were found 0.0009 and 0.0041 ha.

Table 2.15: Distribution of HH using land by type

Type of land	Ave. area (ha)	Ave. no. of parcel	Ave. irrigated (ha)
Temporary crop	.9488	4.34	.3620
Temporary graze land	.0000	0.00	0.0000
Temporary fallow	.0082	1.64	0.0000
Permanent crops	.0336	1.30	.0006
Permanent graze land	.0028	0.00	.0000
Appropriate for forest	.0009	0.00	.0000
Appropriate for fishery	.0041	0.00	0.0000
No of HH			117930

Source: Annex Table 35

3.3 Source of Irrigation:

Out of 28915 respondents, who have managed to irrigate in their field with different sources of irrigations for temporary crops, majority (56.48%) 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 (33.33%), and natural flow canal (3.71%).

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	16332	56.48	-	-	-	-	-	-
Continuous flow canal	9637	33.33	-	-	-	-	-	-
Natural flow canal	1072	3.71	-	-	-	-	-	-
Pond/ well	0	0.00	-	-	-	-	-	-
Mixed	268	0.93	-	-	-	-	-	-

Others	1606	5.55	-	-	-	-	-	-
Total	28915	100.00	-	-	-	-	-	-

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

Leased land

Few segment of population (5.38%) have given land to others on lease and the average holding of leased out land is 0.0363 ha/household.

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

Leased out land			HH	
	Area (ha)	Mean (ha/HH)	No.	%
Khet	7091.13	.0637		
Bari	997.28	.0090		
Total	8088.41	.0363	5986	5.38

Source: Annex Table 41 and 42

A total of 16637 households (14.95%) 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	16637	14.95
No	94661	85.05
Total	111298	100.00

Source: Annex Table 43

Out of 14921.35 ha leased in land, major portion i.e. 10451.58 ha (70.04%) of land are found to have leased on crop sharing basis followed by contract (kind) basis 70.04 ha (18.83%). There are various ways of leasing land in the district viz. contract (cash), 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)	1432.46	0.00	0	0.00	1432.46(9.6%)
	Mean (ha/HH)	.0129	0.00	0.00	0.00	0.01
Contract (kind)	Sum (ha)	2810.52	0.00	0	0	2810.52(18.83%)
	Mean (ha/HH)	.0253	0.00	0.00	0.00	0.03
Crop sharing	Sum (ha)	10451.58	0.00	0.00	0	10451.58(70.04%)
	Mean (ha/HH)	.0939	0.00	0.00	0.00	0.09
Exchange for service	Sum (ha)	0.00	0.00	0	0	0.00
	Mean (ha/HH)	0.00	0.00	0.00	0.00	0.00
Mortgage	Sum (ha)	226.65	0.00	0	0	226.65(1.51%)
	Mean (ha/HH)	.0020	0.00	0.00	0.00	0.00
Others	Sum (ha)	0.00	0.00	0	0	0.00
	Mean (ha/HH)	0.00	0.00	0.00	0.00	0.00
Total						14921.35

Source: Annex Table 44

3.4 Cropping Patterns and Cropped Area

Rice-Wheat-Fallow (41.31%), Rice-Fallow-Fallow (27.32%) and Rice-Pulses-Fallow (8.55%) were major cropping pattern of khet land with mean land holding of 0.3736, 0.2471 and 0.0773 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	5445.55	5.41	.0489
Rice-Wheat-Fallow	41582.00	41.31	.3736
Rice-Wheat-Maize	4424.30	4.40	.0398
Rice-Wheat-Vegetable	1275.63	1.27	.0115
Rice-Pulses-Fallow	8607.03	8.55	.0773
Rice-Wheat-Moong (green gram)	358.11	0.36	.0032
Rice-Wheat-Dhaincha (Sun hemp)	0.00	0.00	0.0000
Rice-Potato-Fallow	2095.19	2.08	.0188
Rice-Maize-Fallow	1713.51	1.70	.0154
Rice-Fallow-Fallow	27504.89	27.32	.2471
Rice-Barley-Fallow	0.00	0.00	0.0000
Rice-Millet-Fallow	0.00	0.00	0.0000
Other	7652.31	7.60	.0688
Total (n= 111296)	100658.53	100.00	.9044

Source: Annex Table 45

Maize/Millet-Fallow (27.25%), Maize/Upland rice-Fallow (24.34%) and Vegetable-Maize (10.58%) were major cropping pattern in bari land.

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

Type of cropping pattern	Total area (ha)	Percentage of total land area (%)	Mean (ha/HH)
Maize/Upland rice-Fallow	834.09	24.34	.0075
Maize/Millet-Fallow	933.82	27.25	.0084
Maize/Millet-Wheat	217.59	6.35	.0020
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	90.66	2.65	.0008
Jute-Wheat- Fallow	0.00	0.00	0.0000
Vegetable-Vegetable	253.85	7.41	.0023
Vegetable-Maize	362.65	10.58	.0033
Off season vegetable	163.19	4.76	.0015
Others	571.17	16.67	.0051
Total (n= 111296)	3427.02	100.00	.0308

Source: Annex Table 46

3.5 Use of improved seeds

About 53.66 percent of the HHs reported to have used improved seeds. Among this 80.40 percent households were using improved seeds of rice followed by wheat 82.15 percent and maize 9.72 percent.

Table2.8: HH using improved seeds (%)

Use of improved seeds	HH	
	No.	%
Yes	59719	53.66

No	51574	46.34
Total	111293	100.00

Source: Annex Table 45 and 46

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

Commodity	HH	
	Nos	%
Rice	46508	80.40
Wheat	47521	82.15
Maize	5622	9.72
Oilseed	0	0.00
Pulses	3748	6.48
Vegetables	3843	6.64
Potato	3480	6.02
Sugarcane	5087	8.79
Other	268	0.46
Total	57847	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 Sell centers is found to be the major place where 45.47 percent of households sell their products, which is followed by rural haat bazar accounting for 34.15 percent of households. Only 10.97 percent of household sells their product at farm gate followed by district market (3.14%).

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

Place of sale	HH	
	No.	%
Farm gate	1874	10.97
Rural haat bazar	5833	34.15
District market	535	3.14
Vendor	0	0.00
Cooperatives	0	0.00
Sell centers	7764	45.47
Others	2410	14.11
Total	17077	100.00

Source: Annex table 49

3.7 Use of Chemical Fertilizers and Pesticides

As regards to the use of chemical fertilizer and pesticides out of a sample of 111302 HH, 96.87 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	107822	96.87
No	3480	3.13
Total	111302	100.00

Source: Annex Table 50

As has been reported by MoAD, the total amount of fertilizer sold in the district is divided by the cultivated area to obtain average amount of Nitrogen, Phosphate and Potash used in farm in different varieties of crops, which is given in the following table. However, the amounts of different fertilizer

nutrients used are all lower than the recommended dose in all kinds of crops whether it is irrigated or rain-fed.

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

Nitrogen	Phosphate	Potash
23.77	13.68	1.48

Source: MoAD (2014)

From the following table, it is clear that out of 107822 households using fertilizers and pesticides, 42.59 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	45915	42.59
No	61900	57.41
Total	107815	100.00

Source: Annex Table 51

3.8 Sources of Fertilizers/Pesticides

There are various sources of buying fertilizers/pesticides for the use of agricultural purposes. Among them agro-vets was the main source, from where 64.92 percent of the HH buy them, followed by cooperatives (13.75%).

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

Source	HH	
	No.	%
Cooperatives	5622	13.75
Agro vets	26543	64.92
DADOs/ASCS	268	0.65
Neighbor farmers	2410	5.89
Relatives	1817	4.44
Others	4494	10.99
Total	40885	100.00

Source: Annex Table 52

A total of 19104 household reported that they get the information on safe use of fertilizer and pesticides. Out of them 28.03% of HHs use their own experience on safe use of fertilizer and pesticides followed by getting information from friends (23.82%) and followed by from purchasing shop (21.82%).

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

Source	HH	
	No.	%
From Purchasing Shop	4169	21.82
Extension Service	0	0.00
Neighboring Farmers	1874	9.81
Friends	4551	23.82
Relatives	2888	15.11
Own Experience	5355	28.03
Other	535	2.80
Total	19104	100.00

Source: Annex Table 53

3.9 Reason for Low Use of Fertilizers/Pesticides:

An enquiry into the reason for inadequate use of fertilizer nutrients/pesticides by the farmers, lack of money is reported by 95.09 percentage of the HH and non-availability in time was reported by 3.27 percent households.

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

Reason	HH	
	No.	%
Not available	2140	3.27
No money	62168	95.09
Other	1071	1.64
Total	65379	100.00

Source: Annex Table 54

There is very low existence of advice on safe use of fertilizer and pesticides as only 18.13 percent of households reported its existence.

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

Response	HH	
	No.	%
Yes	20173	18.13
No	91118	81.87
Total	111291	100.00

Source: Annex Table 55

3.10 Livestock Production

Livestock is closely associated with agricultural occupation of the population, hence is an integral part of agriculture for their livelihood. Those who have adopted agriculture as their main occupation, used to hold the livestock as well, as such 79.92 percent of the households have held livestock.

Table 2.18: Frequency and percentages of households raising livestock

Response	HH	
	No.	%
Yes	88942	79.92
No	22353	20.08
Total	111295	100.00

Source: Annex Table 56

The distribution of types of breeds of livestock owned by the HH is presented in the following table. As revealed from the same table majority of the HH have raised local breeds of all kinds of livestock such as cattle, buffaloes, goats, sheep and pigs. Improved breeds of cows, buffaloes and goat were raised by 3.01, 0.60 and 1.51% of HH.

Table 2.197: Types of breeds of livestock owned

Animal	Type	HH (%)	HH	Animal (no.)	Mean (Animal/HH)
Cattle	Local	51.92	46182	74867	1.62
	Improved	3.01	2677	5087	1.90
Buffalo	Local	37.13	33026	53048	1.61
	Improved	0.60	535	2945	5.50
Goat	Local	56.50	50256	162625	3.24

	Improved	1.51	1339	10709	8.00
Sheep	Local	1.20	1071	2410	2.25
	Improved	0.30	268	268	1.00
Pig	Local	0.90	803	3748	4.67
	Improved	0.30	268	803	3.00
Horse/Mule	Local	0.30	268	268	1.00
Others	Local	8.00	7114	13214	1.86
Total		n=88942			

Source: Annex Table 57

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

3.12 Livestock Housing and Feeding

Regarding the livestock housing and feeding 69.32 percent of the HH have reared their livestock in the shed separately; it was followed by both types of housing (21.31%) and in the residential house (9.37%).

Table 2.20: Place of housing of livestock

Place of housing livestock	HH	
	No.	%
In the shed separately	61652	69.32
In the residential house	8336	9.37
Both	18950	21.31
Total	88938	100.00

Source: Annex Table 58

3.13 Milk and Milk Products

Among those HH who have raised livestock, only 18.47 percent have reported that they sell milk and milk products. The amount of milk sold per annum was found to be 533 litres per household.

Table 2.21: Milk and milk products production and sale

Response	HH		Average milk sold/year (litre)
	No.	%	
Yes	16426	18.47	533.0
No	72513	81.53	-
Total	88939	100.000	

Source: Annex Table 59 and 60

Large percentage (75.59%) of the HH sold their milk at home followed by 18.16 percent at village and 3.30% percent HH sold milk at Neighbor.

Table 2.22: HH selling milk at different places

Different Place to sell Milk	HH	
	No.	%
Home	12258	75.59
Collection center	268	1.65
Village	2945	18.16
Neighbor	535	3.30
District headquarter	210	1.30
Hotel	268	1.65
Others	268	1.65
Total	16216	100.00

Source: Annex Table 61

3.14 Feeds and feeding

Regarding the type of feeding for the livestock, stall feeding was practiced by 24.19 percent household while feeding in pasture land was reported by 2.71 percent. Stall feeding as well as feeding in pasture land both was reported by 73.10 percent households.

Table 2.23: HH with different type of feeding

Type of feeding	HH	
	No.	%
Stall feeding	21515	24.19
Feeding in pasture land	2411	2.71
Both	65018	73.10
Total	88944	100.00

Source: Annex Table 62

Regarding the type of feeds given to the livestock, green grasses constituted major portion of livestock feed as it was fed by 80.60 percent of households followed by 61.57 percent who fed fodder/straw and 19.28% of HHs feed concentrates to their livestock.

Table 2.24: Livestock feeds and feeding types

Types of Feeds	HH	
	No.	(%)
Fodder/straw	51957	61.57
Green Grasses	68021	80.60
Forage	6693	7.93
Concentrates	16274	19.28
Mixed	10116	11.99
Other	535	0.63
Total	84390	100.00

Source: Annex Table 63

3.14 Poultry

Poultry was raised by 24.07 percent of the households in the district.

Table 2.25: Households raising poultry

Rearing of poultry	HH	
	No.	%
Yes	26790	24.07
No	84506	75.93
Total	111296	100.00

Source: Annex Table 64

Of the total birds, local birds were raised by 30.34 to 60.10 percent of household and only 7.78 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 layer per farm is found to be at 1000. On the other hand, the average number of local cock and local hen is found to be 2.83 and 3.31 respectively. Similarly, the average number of ducks per HH was found to be 2.63 for local cock and 3.18 for local hen and around 7.68 and 8.50 in case of pigeon

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

Types of birds	Nos of HHs	%	Sum	Mean
Poultry				
Local Chick	8127	30.34	34727	4.27

Local Cock	14553	54.32	41153	2.83
Local Hen	16101	60.10	53238	3.31
Local dry	1874	7.00	6426	3.43
Improved Broiler	210	0.78	210200	1000.00
Improved Layer				
Duck				
Local Chick	535	2.00	2945	5.50
Local Cock	4284	15.99	11245	2.63
Local Hen	4551	16.99	14457	3.18
Local Dry				
Pigeon				
Local Chick	3213	11.99	21151	6.58
Local Cock	8337	31.12	64060	7.68
Local Hen	8070	30.12	68592	8.50
Local Dry	535	2.00	1606	3.00
Total	n=26790			

Source: Annex Table 66

3.16 Fishery

It was surprising that though the nature of the district is plains terai, fishery is not found to be one of the familiar components of agriculture, the share of households in this field is found to be 2410 households with average area of 6.02 ha of pond area. Average quantity of fish sold was accounted 8321.43 kg per respondent household in the district

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

HH (No.)	Number of pond/HH	Pond area/pond (ha)	Quantity of Fish Sold (Kg)
2410	1	6.02	8321.43

Source: Annex Table 67

3.17 Forest

As regards to the HH involving in forest land, a total of 1339 HH (35.71%) of the HH involving in community forest with the average holding 238.20 ha /HH. Similarly, households involving in each compact forest scatter forest and NTFP Area is 7.14 percent with the average holding 1 ha /HH. While majority of household 42.86 percent were involving in other forest area.

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

Different forest area	No of HHs	% of HHs	Total area (ropani)	Mean
Compact Forest	268	7.14	268	1.00
Scatter Forest	268	7.14	267.73	1.00
NTFP Area	268	7.14	267.73	1.00
Community Forestry	1339	35.71	318866.43	238.20
Other Forest Area	1606	42.86	370002.86	230.33
Total	n=3748			

Source: Annex Table 68

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

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

4.1 Climatic Hazards, their Occurrence and Support

The survey result about the experience on climate change by the community revealed that the HH experiencing climate change was during the last one year is reported by 89.57 percent of the HH out of 111295 households. In case of climatic hazards, 99.19 percent of the HH who have experienced climate change reported extreme high temperature which is followed by experience on *drought* (90.45%), *extreme cold* (89.58%), *hail storm* (73.66%), *flood* (49.82%) and *extreme frost* (38.9%).

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

Experiencing climate change	HH	
	No.	%
Climate change	99688	89.57
Experiencing Climatic Hazards		
Hail Storm	73433	73.66
Extreme high temperature	98885	99.19
Extreme cold	89305	89.58
Extreme Frost	38781	38.90
Floods	49663	49.82
Drought	90165	90.45
Others	3480	3.49
Total	99688	100.00

Source: Annex Table 69 and 70

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

At the time of occurrence of hazards, it is natural and obvious to seek support from the government as well as from the NGOs/INGO. In this regard, out of 96208 households who got support, 73.80 percent reporting family support as main support followed by their own saving 63.07%. Either Support from their assets or friend/relative was reported by 33.15% and 14.35 percent of the households.

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

Agencies	HH	
	No.	%
Government support	2142	2.23
Family support	71004	73.80
INGO	1874	1.95
Saving	60677	63.07
Asset	31897	33.15

Friend/relative	13807	14.35
Others	268	0.28
Total	96208	100.00

Source: Annex Table 71

At the time of occurrence of hazards, it is the responsibility of the people to protect their life and their goods, agricultural crops, livestock etc. provided that if the people have knowledge and experience about the reduction of hazard due to climate change. In this regards, 98.11% of household reported that they protect their lives followed by protect household goods (62.43%), protect livestock (28.35%) and protect agriculture (10.22%).

Table 3.3: Households taking measures to mitigate climatic hazards

Measures	HH	
	No.	%
Protect lives	97069	98.11
Protect household goods	61768	62.43
Protect agriculture	10116	10.22
Protect livestock	28054	28.35
Protect others	1339	1.35
Total	98943	100.00

Source: Annex Table 72

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

4.2 Experience on different types Climatic Extremes in different Seasons

During last 10-15 years, 86.58% of the household reported experiencing change in climate.

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

Response	HH	
	No.	%
Yes	96364	86.58
No	14933	13.42
Total	111297	100.00

Source: Annex Table 73

Among HH who had experienced change in climate, 88.33% of the HH reported low rainfall during rainy season while 9.72% reported high rainfall. Frequent floods and droughts were reported by 23.56% and 84.78% HH and more frost was reported by 7.16% HH in rainy season. Increased temperature was reported by 77.79, 57.95 and 21.21% HH during dry, rainy and winter season. Frequent hail storm was reported by 33.04% of the HH during winter season (Table 3.5).

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

Types of Climatic Extreme	Dry Season (Jan-April)		Rainy Season (May-August)		Winter Season (September-December)		Total	
	No.	%	No.	%	No.	%	No.	%
Less overall rainfall	82554	85.67	85116	88.33	78213	81.16	95825	99.44
More overall rainfall	3480	3.61	9371	9.72	13387	13.89	22489	23.34
More frequent drought	88386	91.72	81693	84.78	75325	78.17	93741	97.28
More frequent flood	2410	2.50	22700	23.56	17135	17.78	37157	38.56
Strong wind	70316	72.97	25299	26.25	15261	15.84	79724	82.73
More cold spells or foggy days	22642	23.50	6903	7.16	70353	73.01	84007	87.18
Higher temperature	74962	77.79	55838	57.95	20443	21.21	90528	93.94
Frequent hailstorm	19544	20.28	16006	16.61	31840	33.04	52933	54.93
Lower ground water table	77850	80.79	46908	48.68	38781	40.24	90471	93.88

Total	n=96364
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Source: Annex Table 74

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

4.3 Early Warning Messages

Though there are some services of early warning messages through various organizations, these messages were not being implemented by the community as they have less capacity to cope with disaster. They are more dependent on natural on natural resources for their livelihoods. In this regards, the survey result shows that the awareness on early warning message about climate/weather hazards were reported by 23.37 percent of the HH in the district.

Table 3.6: Households reporting receipt of early warning messages

Response	HH	
	No.	%
Yes	26006	23.37
No	85287	76.63
Total	111293	100.00

Source: Annex Table 75

Among various sources of early warning messages (such as telephone, Radio/TV, siren, Bulletin/Newspaper), Majority of HHs (90.25%) have reported about the early warning was received from Radio/TV followed by bulletin/newspaper (35.26%) and telephone (25.28%).

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

Sources	HH	
	No.	%
Telephone	6100	25.28
Radio/TV	21781	90.25
Siren	2677	11.09
Colorful flag	1339	5.55
Hand mike	1339	5.55
Bulletin/newspaper	8510	35.26
Others	268	1.11
Total	24133	100.00

Source: Annex Table 76

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

Communication plays an important role for the development of any region or place. When asked about the early warning system from various communication media, 91.34 percent of HH preferred digital display board, FM Radio/TV (77.30%), SMS on mobile (67.35%), siren (51.01%) and telephone (48.13%) as medium for delivery of early information. Internet is preferred by 7.41 percent of HHs.

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

Medium for delivery of Early information	HH	
	No.	%
Telephone	53564	48.13
SMS on mobile	74962	67.35
Siren	56776	51.01
FM Radio/TV	86034	77.30
Newspaper	31457	28.26
Digital display board	101658	91.34
Internet	8242	7.41
Others	535	0.48

Total	111296	100.00
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Source: Annex Table 77

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

When asked about the location for fixing the digital display board, Agro Vet was given the highest priority for placing the digital display board by 45.99 percent of the households. Second priority was given DADO/DLSO offices (32.79%) followed by Agriculture/Livestock Sub Center (13.95%).

Table 3.9: Priority of location suitable for Digital Display Board

Location	HH	
	No.	%
DADO/DLSO offices	35970	32.79
Agriculture/Livestock Sub Center	15297	13.95
VDC/DDC offices	3213	2.93
Markets	4284	3.91
Agro Vet	50444	45.99
Other place	478	0.44
Total	109686	100.00

Source: Annex Table 78

4.3.2 Accessibility to Agricultural Advice and Sources

There are various sources of agro and agro-met advisory service providers in the district such as District Agriculture Development Office (DADO), Livestock Service Centre (LSC), Agricultural Research Farm, NGOs/INGOs, and Agro Vets etc. in the district. However, the survey result shows that 26.12 percent of the HH are found to have received agro advisory service during the last 12 months (Annex Table 79).

Sources of agro advisories

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

4.3.3 Need for Agro Advisory

At present thought overwhelming majority of the respondents are found to have not taken advisory, they were interested to have advice from the service providers. In this regards, 99.32 percent of the HH have preferred mobile service, 94.60 percent toll free service, 91.59 percent digital display board at district office, 36.80 percent telephone and 30.71 percent newspaper/bulletin. Few HH (12.37%) have preferred internet service.

Table 3.10: HH preferring advisory services by type

Types of advisory	HH	
	No.	%
Mobile service	77677	99.32
Telephone	28780	36.80
Newspaper/Bulletin	24018	30.71
Toll free	73986	94.60
Internet service	9676	12.37
Digital display board	71634	91.59
Others	3423	4.38
Total	78213	100.00

Source: Annex Table 81

4.3.4 Communication and Media for Agricultural Program

For the development of any region or place communication plays an important role. There are number of communication media such as FM radio, television, newspaper etc., through which agriculture programmes are being broadcasted in order to make farmers aware of adopting farming system and disseminating information on pre-warning of climate and weather. However, from the survey it is observed that the percentage of HH listening agriculture programme on radio is found to be quite low at only 4.09 percent of the households regularly listened. Only 3.37 percent of the household reported watching agricultural program in television and 10.62 percent of theHH read newspapers and magazines. This shows that communication media are not effectively penetrating to general mass of people (annex Tables 82, 83 and 84)

Annex 1**Average Maximum and Minimum Temperature and Rainfall, Janakpur**

Month	Maximum Temperature (°C)	Minimum Temperature (°C)	Rainfall (mm)	No. of Rainy days
January	21.7	9.5	9.5	1.4
February	26	12.2	5.6	1
March	31.5	16.2	9.4	1.2
April	34.7	21.1	59.2	4.3
May	33.9	23.9	166.7	8.2
June	33.5	25.7	339.2	12.4
July	32.5	26.3	531.5	15.7
August	33	26.6	311.5	11.9
September	32.6	25.5	194.4	9.9
October	31.6	22.1	56.3	3.3
November	29.2	15.9	0	0.1
December	24.8	11.1	1.6	0.2