

Sampling Frames for Agricultural Censuses and Surveys

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Introduction

The Central Bureau of Statistics (CBS) is responsible for carrying out decennial agricultural census which is an important source of agricultural statistics regarding the structure of agriculture. Nepal has been conducting Agricultural Censuses under the recommendations and framework of Food and Agriculture Organization (FAO) World Programme for the Census of Agriculture since 1961-62. The Agricultural Censuses conducted so far are: first (1961-62), second (1971-72), third (1981-82), fourth (1991-92), fifth (2001-02) and sixth (2011-12).

The basic information needed for the agriculture census is the agriculture holding which is based on the information collected in the population census. This is the ultimate sampling unit of the agriculture census.

Agriculture holding

In agricultural census (whether it is based on complete enumeration or on a sample), the aim is to obtain information on various characteristics of “operational holdings”. Hence, in agricultural census, operational holdings constitute the population and the frame, to be used in the data collection phase, is defined as the list of the operational holdings. An agricultural holding is an economic unit of agricultural production under single management comprising all livestock and poultry kept, and all land used wholly or partly for agricultural production purposes. A holding is considered to be an agricultural unit satisfying any one of the following conditions:

- having area under crops greater than or equal to 4 Ana (0.01272 ha) in Hills & Mountains, or greater than or equal to 8 Dhur (0.01355 Ha) in the Tarai; or
- keeping 1 or more head of cattle or buffaloes; or
- keeping 5 or more head of sheep or goats; or
- keeping 20 or more poultry

A household with livestock but no land is not considered a holding if the household did not use the livestock for agricultural purposes (e.g., a livestock trader). A holding includes all land operated within the district, whether or not it is owned by the holding. The holding's land may consist of one or more parcels located in one or more separate areas. The holding is generally the same as a household. Public grazing land is excluded. Land owned jointly by more than one person for grazing or other purposes is included. Holdings are defined in terms of their land and livestock holdings on the day of the census enumeration.

Master Sampling frame

In Nepal, the master sampling frame has not been prepared for the agricultural census and survey purposes. However, the information required for the master sample frame is available both from the listing of the population census and agricultural census. The Table of sample allocation (given in

Annex 1) can be considered as the master sample frame for agricultural surveys. CBS has not initiated any preliminary work for the purpose of preparing area sampling frame yet.

Sampling design

The tentative sample size for the agriculture census 2011/12 was estimated at 130,000 agricultural households (holdings) selected from 5,200 PSUs (the smallest administrative unit, ward) across the country. The number of PSUs to be allocated for each district was determined on the basis of the total area under 9 major crops (paddy, wheat, maize, millet, barley, sugarcane, oilseeds and potato) in the district (X_d). Average area of 9 major crops (for the last three years) published by the Ministry of Agriculture Development (MOD) was the measure of size for the allocation. The number of PSUs (n_d) to be selected from a district was based on the “compromise power” allocation.

$$n_d \propto (X_d)^{0.4}$$

In the last census (2011/12), 5,200 sample holdings were allocated to 75 districts following compromise power allocation method. Samples were allocated to different districts in proportion to $x^{0.4}$, where x was the size measure.

Frame for primary sampling units (PSUs) - The “House/Household Listing Form” of the 2011 population census contained the following information on agriculture – number and area of holdings; and number of livestock and poultry birds.

Agriculture Module in Population Census 2011 for Nepal

10. Does your household operate any land for agriculture purpose?			
Yes/ No			
If yes, the total area of the land in			
11) Bigha	12) Katha	13) Dhur	
14) Ropa	15) Ana	16) Paisa	
17) Does your household raise livestock/poultry for agriculture purpose?			
Yes/ No			
If yes, the total number of livestock/poultry for agriculture purpose			
<u>Livestock</u>			
18) Cow/Ox	19) Buffalo	20) Yak/ Nak/ Chauri	21) Horse/Ass
22) Sheep	23) Goat	24) Pig/pork	25) Other
<u>Poultry</u>			
26) Chicken	27) Duck	28) Other	
(Serial numbers of questions are same as in the questionnaire)			

Population Census 2011 project had prepared enumeration area (EA) maps for 44 municipalities of the country and for village development committees (VDCs) of 12 district headquarters. Further,

enumeration area (block) maps were prepared for a few large VDCs of the country. Those EA maps were used in the fieldwork of the 2011/12 census of agriculture.

According to the 2011 census, a ward in a VDC/municipality on average contained about 150 agricultural households, but there was a wide variation between wards. On the whole, there were almost 1,600 wards with very small numbers of agricultural households (less than 25). These small wards needed to be combined with neighbouring wards in the same VDC, so as to ensure enough agricultural households in each PSU for the final stage of selection. For some very large wards, on the other hand, some kind of segmentation of wards became necessary.

Combination of small wards – Since the average number of agricultural households (holdings) to be enumerated in each ward was set at 25 there would be problem if the ward contained less than 25 holdings. To avoid this problem, a small ward was grouped with one or more neighbouring ward(s) of the same VDC, so that the combined total exceeded 25 agricultural households. Whenever such a combined PSU of wards is selected, all the wards will be taken for second stage listing (listing of holdings).

Segmentation of large wards - In the case of very large wards, it was necessary to use segmentation for making sizable PSUs. For such wards, the block maps prepared for the 2011 population census were used.

Selection of primary sampling units (PSUs) - The sketches and maps used in the 2011 population census were used for preparing the frames of PSUs by merging nearby wards (or sub-wards) in case when number of agricultural holdings was less than 25. As mentioned earlier, around 1,600 wards were found to have less than 25 holdings.

Information on agricultural households was transcribed from 36,022 wards of 3,960 VDCs and municipalities taken together. From these wards 36,257 PSUs were constructed after combination of small wards and segmentation of very large wards. Out of 36,257 PSUs thus formed, 1,029 were combined PSUs and 396 PSUs were the segmented PSUs.

Out of the total PSUs formed by combining two or more wards, the highest proportion was in the hills (47 percent) followed by the mountains (34 percent). Out of the total PSUs formed by segmentation of large wards, on the other, the highest proportion was in the hills (54 percent) followed by the Tarai (42 percent).

List of selected PSUs - After selecting the required number of PSUs in each district (as determined by the method of compromise power allocation), list of selected PSUs to be used in the field was prepared. The SPSS (statistical software) package was used for the purpose. The selected list of the PSUs is presented in the Annex I.

Sampling Frame for Ultimate Sampling Units (Holdings) - Frame for the selection of “holdings” was prepared during the listing of agricultural households. In each of the PSUs, a list of holders was prepared.

Within the selected PSUs, all the operational agricultural holdings were listed and classified into following four categories:

- 1) holdings operating less than one *bigha/10 ropanis* of land,
- 2) holdings operating equal to or more than one *bigha/10 ropanis* of land but less than 3 *bighas/20 ropanis* of land,
- 3) holdings operating equal to or more than 3 *bighas/20 ropanis* of land, and
- 4) holdings having no land but keeping one or more productive animals and/ or keeping 20 or more poultry birds.

Finally, the holdings for the enumeration were selected systematically with a random start. Based on those stratification, the required number of agriculture holdings (25) were selected using systematic sampling and the selected holdings were interviewed immediately after the listing operation.

Estimators used and their precision

The mean and the total of the major characteristics was calculated and presented in the national, regional and district-level reports. They are total area of holdings, area of temporary crops, area under paddy, area under wheat, area under maize, number of cattle number of buffaloes, number of chickens and farm population.

For the first time in Nepal in 1994, the assessment of the quality of the data was done with the technical assistance of the FAO based on the data of national agriculture census 1991/92. A brief overview of sampling errors and their measurements and interpretations were provided, together with an overall assessment of the reliability of the census data from a sampling error point of view. Tables were provided showing a number of sample design parameters for major characteristics, which was utilized to finalize the sample design of agriculture census 2011/12.

Due to some limitations, the assessment of the reliability of the data could not be carried over in 2001/02 census of agriculture. For 2011/12 round, some preliminary exercises have been done to calculate the values of some of the indicators identified in 1994 FAO's assistance on Technical Report of "The Reliability of Data". The output of the exercise is presented in Annex 2.

New features of agriculture census 2011/12

Production of major crops

The information on the production of the major crops was included in 1961/62 in the first census of agriculture, for the first time in Nepal. This information was not collected in the subsequent censuses but included in the census of 2011/12. The inclusion of the production of major crops in the census was to validate the annual crop production estimates compiled by the Ministry of Agriculture Development. The following table depicts the changes observed in yield rate of the major crops for the period of 50 years.

Average yield of crops, Nepal, 1962 and 2012								
Year	Rice	Maize	Wheat	Millets	Mustard seed	Sugarcane	Jute	Potatoes
100 kg/ha								
1961/62	20.10	10.76	9.46	13.12	5.53	198.86	12.36	66.28
2011/12	29.70	23.41	22.97	11.27	7.31	393.96	n. a.	130.41
Absolute Change	9.60	12.65	13.51	-1.85	1.78	195.10	..	64.13
Percent Change	47.8	117.6	142.8	-14.1	32.2	98.1	..	96.8

Community Questionnaire

The community questionnaire was administered to collect community level data in the agriculture census 2011/12 for the first time in Nepal based on the guidelines of "World Program for the Census of Agriculture 2010". Community-level data in an agricultural census can be tabulated in two ways: first, to summarize the characteristics of communities; and second, to use as classification items for tabulations of census holding-level data in the core and supplementary modules.

The community questionnaire was used to gather "ward level" information on socio-economic conditions, community infrastructure and service and development projects.

Resource mobilization and Cost

There were 1600 enumerators, 550 supervisors, 75 census officers and 350 support staff involved in the field work of the agriculture census 2011/12 excluding census core team at the head office. The cost of the fieldwork was about US\$ 1.3 million and the cost of data processing and analysis was about US\$ 50000.

Issues and Challenges

- The situation of IT demands the use of area sampling frame due to the lack of technical knowhow and resources.
- Recall periods ranged from one to twelve months from the date of enumeration. There was no mechanism available for the enumerator to cross-check the estimates with the reported data.
- As the production figures reported by the farmers were based on their recall or prediction, these might have included several types of "measurement and response errors".
- Farmers do not understand or follow this standard definition while reporting their estimates.
- There are different local units of area and weight measurement used by farmers in different parts of the country. Conversion of figures in local units to standard units is one of the possible sources of errors.
- Farmers often forget to include in-kind payments (such as payments to laborers or gifts to family and friends) in their production estimates.
- A major source of error in long-duration fieldwork and lengthy interviews is that of "enumerator and respondent fatigue".

- Recruitment of the field staff has faced constraint of hiring and selecting the staff as a result of the government rules to hire maximum of 50 percent of the staff externally.
- In mountain region, the enumeration period and Agriculture farming period was at same time that was inconvenient for enumerator and farmer.
- Insufficient transportation expenses and training allowance hindered the task to difficult geography.
- Respondents expect to see direct benefits from the census rather than understanding the fact of providing data could play a crucial role for planning purpose.
- Respondents were unaware and scared to provide real data on area of agriculture land due to fear of taxation policy of the government.
- The manual of community questionnaire introduced in WPCA 2010 lacks tabulation plans to supplement the information collected at the holding level.

Lesson learned

- The information collected in the “House/Household Listing Form” of the 2011 census was the basis for constructing the PSUs. However, data from the “Listing Form” were not processed in time for the frame construction. So it was decided to adopt an alternative method - the number of agricultural households was transcribed from the “Listing Form” based on “quick counts”. The number of SSUs was slightly reduced than the size fixed by the design as a result of this.
- Associated gap between the population census and agriculture census should be extended for more than one year. Census of 2011/12 had a time constraint of preparing sample frame from population census household listing.
- Human resources should be recruited from fresh and young, who are energetic and dynamic.

Way forward

- CBS has not yet used the latest IT innovation fully for the preparation and management of agricultural census.
- It needs high resolution satellite imageries for capturing the agricultural parcels.
- If resources can be managed, the CBS could do better agricultural census using GIS technology.
- Crop Production Survey using area sampling frame (based on remote sensing) will produce more reliable estimates.
- IT tools like mobile phones and tablets can be used to upload data to storage facilities in real-time.
- Access to IT tools and facilities are especially important for gathering and synchronizing data and statistics.
- Training is another important component of IT use.

References

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Annex 1
National Sample Census of Agriculture 2011/12
Sample allocation

District	DR	Ecological Belt	Agri. Holding	Total VDC/Mun	Selected VDC/Mun	No. of wards	No. of PSUs	Sample PSUs	Sample SSUs
1 Taplejung	EDR	Mountain	26286	50	45	448	396	58	1450
2 Panchthar	EDR	Hill	41129	41	41	369	367	63	1575
3 Ilam	EDR	Hill	64296	49	48	440	443	72	1800
4 Jhapa	EDR	Terai	182036	50	50	470	557	107	2675
5 Morang	EDR	Terai	213363	66	66	607	733	106	2650
6 Sunsari	EDR	Terai	161254	52	50	479	584	89	2225
7 Dhankuta	EDR	Hill	37203	36	36	324	320	67	1675
8 Terhathum	EDR	Hill	21865	32	32	288	284	58	1450
9 Sankhuwasabha	EDR	Mountain	34772	34	33	310	301	67	1675
10 Bhojpur	EDR	Hill	39283	63	53	567	541	68	1700
11 Solukhumbu	EDR	Mountain	23426	34	32	306	380	56	1400
12 Okhaldhunga	EDR	Hill	32206	56	54	504	486	59	1475
13 Khotang	EDR	Hill	42148	76	65	684	644	79	1975
14 Udayapur	EDR	Hill	64819	45	37	413	407	66	1650
15 Saptari	EDR	Terai	120606	115	86	1035	1038	94	2350
16 Siraha	EDR	Terai	119609	108	77	972	957	90	2250
17 Dhanusa	CDR	Terai	139342	102	78	925	960	91	2275
18 Mahottari	CDR	Terai	111299	77	66	697	695	85	2125
19 Sarlahi	CDR	Terai	132297	100	74	901	887	92	2300
20 Sindhuli	CDR	Hill	57003	54	46	495	481	68	1700
21 Ramechhap	CDR	Hill	43123	55	50	495	491	67	1675
22 Dolakha	CDR	Mountain	45402	52	40	472	468	50	1250
23 Sindhupalchok	CDR	Mountain	65585	79	67	711	690	80	2000
24 Kavre	CDR	Hill	80828	90	66	816	786	79	1975
25 Lalitpur	CDR	Hill	107073	42	34	391	426	53	1325
26 Bhaktapur	CDR	Hill	67727	18	18	178	256	50	1250
27 Kathmandu	CDR	Hill	415236	59	46	567	667	53	1325
28 Nuwakot	CDR	Hill	58900	62	54	560	553	72	1800
29 Rasuwa	CDR	Mountain	9718	18	17	162	130	50	1250
30 Dhading	CDR	Hill	73356	50	48	450	449	71	1775
31 Makwanpur	CDR	Hill	85603	44	38	398	457	67	1675
32 Rautahat	CDR	Terai	106417	97	70	876	861	89	2225
33 Bara	CDR	Terai	108411	99	78	896	888	94	2350
34 Parsa	CDR	Terai	96142	83	71	757	796	85	2125
35 Chitawan	CDR	Terai	133489	38	36	350	410	83	2075
36 Gorkha	WDR	Hill	65882	67	54	605	573	73	1825
37 Lamjung	WDR	Hill	41483	61	53	549	508	68	1700
38 Tanahu	WDR	Hill	77702	47	46	425	436	72	1800
39 Syangja	WDR	Hill	68974	62	58	564	585	83	2075
40 Kaski	WDR	Hill	124836	45	41	420	561	77	1925
41 Manang	WDR	Mountain	1389			117		50	1250

42 Mustang	WDR	Mountain	3306	16	16	144	69	50	1250
43 Myagdi	WDR	Hill	27484	41	36	369	334	52	1300
44 Parbat	WDR	Hill	35526	55	51	495	466	62	1550
45 Baglung	WDR	Hill	61055	60	53	542	534	73	1825
46 Gulmi	WDR	Hill	64518	79	62	711	700	65	1625
47 Palpa	WDR	Hill	59630	66	54	600	582	64	1600
48 Nawalparasi	WDR	Terai	128480	74	60	670	664	89	2225
49 Rupandehi	WDR	Terai	165911	71	63	649	698	99	2475
50 Kapilbastu	WDR	Terai	90988	78	67	707	704	96	2400
51 Arghakhanchi	WDR	Hill	46475	42	42	378	378	61	1525
52 Pyuthan	MWDR	Hill	47530	49	47	441	441	58	1450
53 Rolpa	MWDR	Hill	43142	51	48	459	454	56	1400
54 Rukum	MWDR	Hill	41285	43	39	387	384	63	1575
55 Salyan	MWDR	Hill	46211	47	46	423	418	67	1675
56 Dang	MWDR	Terai	119120	41	40	373	413	91	2275
57 Banke	MWDR	Terai	94356	47	44	430	441	81	2025
58 Bardiya	MWDR	Terai	83179	32	32	293	312	84	2100
59 Surkhet	MWDR	Hill	72747	51	44	462	499	72	1800
60 Dailekh	MWDR	Hill	48837	56	49	504	499	63	1575
61 Jajarkot	MWDR	Hill	30289	30	30	270	269	53	1325
62 Dolpa	MWDR	Mountain	7313	23	22	207	160	50	1250
63 Jumla	MWDR	Mountain	19404	30	30	270	261	50	1250
64 Kalikot	MWDR	Mountain	22928	30	29	270	266	50	1250
65 Mugu	MWDR	Mountain	9476	24	23	216	174	50	1250
66 Humla	MWDR	Mountain	9383	27	27	243	183	50	1250
67 Bajura	FWDR	Mountain	24433	27	27	243	240	50	1250
68 Bajhang	FWDR	Mountain	33447	47	44	423	413	50	1250
69 Achham	FWDR	Hill	47855	75	52	675	637	52	1300
70 Doti	FWDR	Hill	41055	51	42	463	440	56	1400
71 Kailali	FWDR	Terai	140772	44	42	401	466	103	2575
72 Kanchanpur	FWDR	Terai	81657	20	20	180	214	88	2200
73 Dadeldhura	FWDR	Hill	26516	21	21	191	192	50	1250
74 Baitadi	FWDR	Hill	44888	63	46	571	554	51	1275
75 Darchula	FWDR	Mountain	24557	41	38	369	346	50	1250
Nepal			5385271	3960	3440	36022	36257	5200	130000

EDR: Eastern Development Region

CDR: Central Development Region

WDR: Western Development Region

MWDR: Mid-Western Development

Region

Far-Western Development

Region

The district "Manang" was completely enumerated and number of selected PSUs were about 50.

Annex 2

National Sample Census of Agriculture 2011/12, Nepal Standard Errors

Data item	Census estimate	Standard error	Relative standard error
<i>Total Nepal</i>			
Total area of holdings (ha)	2522026.40	16043.81	0.64
Area of temporary crops (ha)	2122966.50	49243.78	1.26
Area under paddy (ha)	1455982.50	25167.05	1.73
Area under maize (ha)	673619.50	12072.60	1.79
Area under wheat (ha)	749315.20	12489.78	1.67
Number of cattle	6427894.00	71576.68	1.05
Number of buffaloes	3174347.00	76970.76	2.13
Number of chickens	26266147.00	1560822.66	5.94
Farm population	20549055.00	99468.27	0.48

These estimates are different from the National Report as the district "Manang" is excluded here due to the complete enumeration in this district.

National Sample Census of Agriculture 1991/92, Nepal Standard Errors

Data item	Census estimate	Standard error	Relative standard error
<i>Total Nepal</i>			
Total area of holdings (ha)	2579400.00	21070.00	0.80
Area of temporary crops (ha)	2284580.00	17110.00	0.70
Area under paddy (ha)	1481240.00	15250.00	1.00
Area under maize (ha)	768730.00	7970.00	1.00
Area under wheat (ha)	633060.00	6920.00	1.10
Number of cattle	7359330.00	44720.00	0.60
Number of buffaloes	3116320.00	27720.00	0.90
Number of chickens	12333140.00	540790.00	4.40
Farm population	16258220.00	36950.00	0.20

These estimates are different from the National Report as the district "Manang" is excluded here due to the complete enumeration in this district.

Annex 3

National Sample Census of Agriculture, 2011/12 Sample Design Parameters

District Code	District	Area of holdings			Area under paddy			Area under maize		
		Coefficient of variation	Design effect	Measure of homogeneity	Coefficient of variation	Design effect	Measure of homogeneity	Coefficient of variation	Design effect	Measure of homogeneity
1	Taplejung	1.05	3.80	0.13	0.80	3.90	0.28	0.95	6.51	0.25
2	Panchthar	0.93	1.29	0.01	0.97	2.62	0.20	0.90	8.33	0.34
3	Ilam	0.87	5.08	0.18	0.85	1.68	0.06	0.93	3.02	0.10
4	Jhapa	1.07	3.70	0.13	0.99	2.27	0.08	1.08	1.40	0.03
5	Morang	1.27	2.71	0.08	1.08	2.43	0.09	1.09	2.13	0.12
6	Sunsari	1.33	5.91	0.25	0.97	2.48	0.09	1.72	2.59	0.27
7	Dhankuta	0.93	3.02	0.09	0.85	4.01	0.36	0.84	3.67	0.12
8	Terhathum	0.86	3.84	0.12	0.75	3.19	0.20	0.82	7.26	0.29
9	Arghakhanchi	0.77	0.96	0.00	0.83	2.94	0.13	1.04	5.06	0.19
10	Bhojpur	0.82	6.48	0.24	0.82	3.62	0.20	0.80	4.62	0.16
11	Solukhumbu	0.88	9.10	0.35	0.97	2.64	0.21	1.09	6.58	0.26
12	Okhaldhunga	0.93	9.00	0.35	0.92	2.03	0.08	0.88	8.55	0.33
13	Khotang	0.86	1.28	0.01	0.94	2.76	0.13	0.88	4.26	0.14
14	Udayapur	0.94	0.59	0.02	1.05	2.42	0.09	0.98	2.14	0.06
15	Saptari	1.25	2.04	0.05	0.99	2.75	0.09	0.86	5.84	2.74
16	Siraha	1.02	2.01	0.05	1.00	1.50	0.03	0.88	3.43	0.41
17	Dhanusa	1.08	2.13	0.05	1.03	2.33	0.07	1.19	2.18	0.36
18	Mahottari	1.15	1.34	0.02	1.20	1.17	0.01	0.81	5.13	0.68
19	Sarlahi	1.18	1.97	0.05	1.11	1.07	0.00	1.38	2.84	0.24
20	Sindhuli	0.86	3.69	0.12	0.85	2.96	0.12	0.81	6.96	0.27
21	Ramechhap	0.93	5.39	0.20	0.83	2.86	0.17	0.98	4.46	0.16
22	Dolakha	0.77	1.88	0.04	0.84	3.21	0.19	0.84	2.17	0.06
23	Sindhupalchok	0.81	5.96	0.22	0.88	10.66	0.55	0.86	3.20	0.10
24	Kavrepalanchok	0.93	6.51	0.24	0.92	2.20	0.09	0.87	6.28	0.25
25	Lalitpur	1.34	8.33	0.34	0.82	2.52	0.11	1.39	12.19	0.67
26	Bhaktapur	0.88	3.76	0.13	0.89	4.00	0.16	1.32	2.30	0.11
27	Kathmandu	1.07	4.52	0.17	0.96	2.12	0.08	1.56	5.85	0.33
28	Nuwakot	0.74	8.10	0.30	1.00	7.69	0.37	0.81	6.32	0.24
29	Rasuwa	0.80	4.93	0.17	0.92	4.15	0.26	0.83	3.53	0.11
30	Dhading	0.73	0.84	0.01	0.89	2.92	0.13	0.87	3.90	0.13
31	Makwanpur	1.05	4.54	0.16	1.16	0.93	0.01	1.18	4.53	0.17
32	Rautahat	1.24	1.74	0.03	1.29	1.49	0.02	1.56	3.01	0.35
33	Bara	1.17	1.88	0.04	1.17	1.60	0.03	1.07	3.22	0.27
34	Parsa	1.22	5.41	0.20	1.20	5.34	0.20	0.90	2.21	0.27
35	Chitawan	1.05	2.79	0.08	1.02	5.21	0.23	1.22	3.73	0.15

36	Gorkha	0.74	5.97	0.22	0.83	4.68	0.23	0.85	6.77	0.26
37	Lamjung	0.78	4.06	0.13	0.77	1.71	0.04	0.82	6.05	0.23
38	Tanahu	0.84	2.74	0.08	0.87	2.54	0.13	0.95	6.02	0.25
39	Syangja	0.83	2.82	0.08	0.84	4.44	0.25	0.84	0.84	0.01
40	Kaski	0.96	5.74	0.21	0.84	4.83	0.27	0.97	5.50	0.23
41	Manang									
42	Mustang	0.84	6.84	0.25	0.80	1.72		0.90	1.05	0.00
43	Myagdi	0.83	6.99	0.25	0.75	4.24	0.23	0.91	10.03	0.40
44	Parbat	0.87	6.26	0.23	0.87	6.83	0.34	0.94	7.95	0.31
45	Baglung	0.95	9.08	0.35	0.83	3.37	0.21	0.92	8.17	0.33
46	Gulmi	0.99	2.94	0.08	0.89	2.05	0.10	0.90	2.67	0.07
47	Palpa	0.85	5.68	0.21	0.83	4.38	0.27	0.83	8.11	0.32
48	Nawalparasi	1.39	2.39	0.06	1.02	1.27	0.01	1.07	4.55	0.25
49	Rupandehi	1.08	3.82	0.13	1.07	4.37	0.16	0.97	5.16	0.85
50	Kapilbastu	1.26	2.40	0.06	1.16	3.66	0.12	1.19	3.18	0.46
51	Arghakhanchi	0.87	3.57	0.11	0.89	2.25	0.15	0.86	1.29	0.01
52	Pyuthan	0.98	5.03	0.17	1.01	2.35	0.13	1.00	3.97	0.13
53	Rolpa	0.87	2.01	0.04	0.97	2.66	0.26	0.76	1.89	0.04
54	Rukum	0.85	5.97	0.22	1.11	8.19	0.79	1.07	6.96	0.27
55	Salyan	0.77	2.07	0.05	0.95	4.60	0.26	0.89	2.40	0.06
56	Dang	0.98	3.40	0.11	0.90	2.59	0.12	1.07	1.98	0.05
57	Banke	1.05	1.74	0.03	0.97	3.21	0.11	1.58	3.03	0.23
58	Bardiya	1.14	4.57	0.16	1.10	6.13	0.27	1.71	0.92	0.01
59	Surkhet	0.92	5.11	0.17	0.88	0.64	0.02	1.08	6.32	0.26
60	Dailekh	0.98	2.17	0.05	0.87	2.70	0.10	0.88	6.41	0.24
61	Jajarkot	0.78	2.43	0.06	0.85	5.01	0.22	0.79	4.98	0.17
62	Dolpa	0.77	6.04	0.20	0.94	3.28	0.65	0.87	8.40	0.32
63	Jumla	0.80	13.15	0.51	0.89	10.63	0.53	1.06	9.18	0.50
64	Kalikot	1.31	12.49	0.49	1.50	13.08	0.61	1.47	7.58	0.31
65	Mugu	0.61	8.72	0.32	0.77	4.44	0.18	1.11	5.72	0.38
66	Humla	0.68	10.15	0.37	1.00	8.60	0.48	0.93	2.66	0.12
67	Bajura	0.98	5.15	0.18	1.21	5.18	0.20	1.51	6.26	0.29
68	Bajhang	0.83	6.70	0.25	0.92	10.11	0.46	1.28	6.66	0.42
69	Achham	0.91	8.26	0.31	0.94	5.45	0.22	1.38	9.42	0.46
70	Doti	0.84	4.04	0.13	0.87	2.98	0.10	1.31	7.28	0.47
71	Kailali	1.28	2.54	0.07	1.30	1.98	0.05	1.44	3.72	0.38
72	Kanchanpur	1.05	3.73	0.12	1.03	2.56	0.07	1.39	2.54	0.16
73	Dadeldhura	0.91	2.80	0.08	1.11	1.11	0.01	1.06	3.10	0.12
74	Baitadi	0.96	10.11	0.39	1.03	15.24	0.87	1.04	8.99	0.36
75	Darchula	0.74	6.26	0.22	0.83	8.24	0.47	0.85	3.05	0.09

National Sample Census of Agriculture, 2011/12
Sample Design Parameters

District Code	District	Area under wheat			Number of cattle			Farm population		
		Coefficient of variation	Design effect	Measure of homogeneity	Coefficient of variation	Design effect	Measure of homogeneity	Coefficient of variation	Design effect	Measure of homogeneity
1	Taplejung	1.01	5.68	0.72	1.02	3.64	0.15	0.40	2.82	0.08
2	Panchthar	0.85	3.89	0.71	0.55	4.13	0.17	0.42	2.57	0.07
3	Ilam	0.99	4.14	0.64	0.50	6.51	0.27	0.38	5.03	0.18
4	Jhapa	0.90	2.07	0.29	0.58	1.89	0.05	0.39	1.51	0.02
5	Morang	1.26	3.85	0.33	0.58	3.49	0.16	0.39	1.11	0.01
6	Sunsari	0.98	2.39	0.13	0.56	1.09	0.01	0.43	3.69	0.12
7	Dhankuta	0.69	3.12	1.64	0.53	3.02	0.11	0.43	2.16	0.05
8	Terhathum	0.80	6.75	1.04	0.51	5.22	0.22	0.44	1.87	0.04
9	Arghakhanchi	0.78	4.25	0.51	0.70	9.54	0.47	0.39	2.78	0.08
10	Bhojpur	0.94	3.20	0.55	0.52	3.40	0.12	0.43	1.67	0.03
11	Solukhumbu	1.04	7.44	0.44	0.54	4.22	0.19	0.43	4.30	0.14
12	Okhaldhunga	1.06	4.13	0.35	0.61	1.25	0.01	0.40	2.40	0.06
13	Khotang	0.90	2.98	0.27	0.59	1.62	0.03	0.40	2.47	0.06
14	Udayapur	0.86	2.09	0.29	0.60	3.64	0.16	0.42	2.14	0.05
15	Saptari	1.04	6.87	0.35	0.57	4.73	0.20	0.43	0.98	0.00
16	Siraha	0.93	1.24	0.02	0.55	3.97	0.20	0.46	2.24	0.05
17	Dhanusa	1.07	1.81	0.05	0.71	3.22	0.17	0.46	1.28	0.01
18	Mahottari	1.11	0.94	0.00	0.54	5.75	0.43	0.43	4.95	0.18
19	Sarlahi	0.89	2.33	0.11	0.54	2.82	0.17	0.46	2.62	0.07
20	Sindhuli	0.81	3.48	0.41	0.60	3.25	0.13	0.42	4.34	0.14
21	Ramechhap	1.00	1.27	0.03	0.51	5.00	0.27	0.47	5.71	0.21
22	Dolakha	0.91	5.50	0.28	0.52	2.24	0.10	0.44	3.91	0.13
23	Sindhupalchok	0.91	6.03	0.47	0.61	2.76	0.16	0.43	1.70	0.03
24	Kavrepalanchok	0.82	4.26	0.33	0.50	0.53	-0.04	0.44	4.75	0.16
25	Lalitpur	0.82	3.20	0.20	0.57	2.73	0.26	0.36	1.90	0.04
26	Bhaktapur	0.91	3.62	0.17	2.56	0.67	-0.04	0.42	2.75	0.08
27	Kathmandu	0.95	0.72	0.02	0.76	1.61	0.08	0.42	3.99	0.13
28	Nuwakot	0.81	2.94	0.18	0.54	4.47	0.29	0.44	0.67	0.01
29	Rasuwa	0.70	3.99	0.43	0.95	2.46	0.15	0.45	6.42	0.23
30	Dhading	0.95	1.28	0.04	0.55	6.46	0.39	0.41	2.69	0.08
31	Makwanpur	0.84	2.62	0.60	0.61	2.31	0.09	0.43	0.96	0.00
32	Rautahat	1.28	0.84	0.01	0.71	1.85	0.14	0.48	2.97	0.09
33	Bara	1.13	2.81	0.10	0.64	1.81	0.13	0.48	3.31	0.09
34	Parsa	1.25	5.11	0.21	0.62	2.06	0.25	0.50	3.82	0.12
35	Chitawan	1.09	1.21	0.04	0.68	2.41	0.20	0.43	2.86	0.08
36	Gorkha	0.68	6.43	1.32	0.74	5.36	0.36	0.45	2.77	0.08
37	Lamjung	0.94	1.72	0.33	0.80	1.71	0.08	0.44	2.69	0.07

38	Tanahu	0.97	3.42	1.17	0.70	7.19	0.51	0.50	3.24	0.10
39	Syangja	0.94	6.01	0.73	0.71	3.91	0.35	0.46	2.99	0.09
40	Kaski	0.82	2.79	0.37	1.10	1.41	0.06	0.44	0.68	0.01
41	Manang									
42	Mustang	0.87	6.39	0.52	0.64	5.85	0.27	0.47	1.85	0.04
43	Myagdi	0.89	2.08	0.08	1.06	3.39	0.20	0.44	1.61	0.03
44	Parbat	0.88	4.61	0.38	0.69	6.05	0.44	0.48	3.34	0.10
45	Baglung	0.85	2.66	0.12	0.90	4.20	0.34	0.45	4.00	0.13
46	Gulmi	0.90	2.57	0.15	0.57	1.55	0.07	0.45	0.79	0.01
47	Palpa	0.84	3.08	0.23	0.64	3.56	0.22	0.46	6.22	0.23
48	Nawalparasi	1.27	1.86	0.07	0.76	1.41	0.06	0.48	3.07	0.09
49	Rupandehi	1.15	2.47	0.10	0.75	1.23	0.02	0.53	1.75	0.03
50	Kapilbastu	1.27	6.08	0.30	0.49	3.50	0.19	0.55	4.42	0.14
51	Arghakhanchi	0.90	2.32	0.07	0.73	3.00	0.19	0.39	2.69	0.07
52	Pyuthan	0.99	3.11	0.12	0.65	2.04	0.08	0.45	2.62	0.07
53	Rolpa	0.88	1.42	0.02	0.58	6.26	0.27	0.41	2.55	0.07
54	Rukum	1.02	3.85	0.13	0.70	2.11	0.07	0.35	1.46	0.02
55	Salyan	0.84	1.54	0.02	0.58	2.07	0.05	0.38	3.96	0.13
56	Dang	0.93	3.42	0.24	0.75	2.33	0.10	0.46	4.78	0.17
57	Banke	1.07	3.97	0.22	0.90	2.07	0.10	0.50	2.33	0.06
58	Bardiya	1.13	4.99	0.34	0.54	0.54	-0.05	0.50	1.54	0.02
59	Surkhet	0.92	1.92	0.05	0.56	9.70	0.47	0.43	2.11	0.05
60	Dailekh	0.88	6.02	0.22	0.63	4.56	0.18	0.39	2.35	0.06
61	Jajarkot	0.72	1.67	0.03	0.56	2.46	0.07	0.37	1.94	0.04
62	Dolpa	0.94	6.31	0.30	0.75	8.94	0.38	0.44	2.41	0.06
63	Jumla	1.21	20.77	1.06	0.59	1.27	0.01	0.40	3.80	0.12
64	Kalikot	1.44	10.65	0.41	0.55	4.33	0.16	0.41	1.90	0.04
65	Mugu	0.74	11.27	0.53	0.61	5.11	0.19	0.37	0.83	0.01
66	Humla	0.93	5.61	0.24	0.65	7.08	0.30	0.40	1.25	0.01
67	Bajura	1.06	4.58	0.16	0.60	8.93	0.37	0.36	1.43	0.02
68	Bajhang	0.99	11.13	0.46	0.47	4.05	0.14	0.37	7.80	0.30
69	Achham	0.89	7.93	0.30	0.63	6.31	0.25	0.40	0.83	0.01
70	Doti	0.83	4.50	0.16	0.55	4.06	0.14	0.44	2.30	0.06
71	Kailali	1.30	3.31	0.14	0.63	4.10	0.20	0.48	2.32	0.06
72	Kanchanpur	0.98	3.79	0.14	0.50	3.12	0.12	0.47	2.90	0.08
73	Dadeldhura	0.96	5.68	0.23	0.51	3.00	0.10	0.44	1.45	0.02
74	Baitadi	0.94	13.36	0.53	0.44	3.38	0.11	0.35	2.13	0.05
75	Darchula	0.82	3.84	0.12	0.51	5.31	0.19	0.42	5.77	0.20