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Spatial Distribution of Population in Nepal: On the Basis of 2078 Census

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Abstract

The indicators of population change, which would affect distribution, include birth rate, death rate, immigration, and emigration. Significant adjustments to any of these indicators can alter how a population is distributed. The general patterns to the distribution of a population are known as spatial distribution patterns. Spatial distribution patterns can be uniform, random, or clumped. Additionally, population distribution is affected by population density, which is the number of individuals within a given area. This paper based on the major aspects of population changes i.e size, growth and distribution of population in Nepal and based on censuses data over time. Population size and growth rate has been increasing over the time. It has rapidly increased since 1961—2011. In 2021 census, total population are 29.1 million, which is an increase of 10.1 million when compared to 26.4 million population recorded in 2011 census with an average annual growth rate of 0.93 percent (2021) lower than 1.35 percent growth rate reported in 2011 census. Tarai accounts 53.6 percent of the total population with percentage of average annual growth rate 1.56. By province level, Madhesh province holds more than twenty percent of the population of the country (i.e 20.99 %) and an average annual growth rate 1.20 percent. It may be due to the inclusion Tarai in this region. The highest population growth rate is found in Bhaktapur district (3.32 %) and while the least is in Ramechhap (- 1.65 %). Overall the current dramatic decline in the population growth rate may be attributed to the absence heavy cause behind migration in various reasons.

Key words: Population size, growth rate, spatial distribution, province levels and density.

Introduction

Census means one of the big surveys of Nepal. It is more collection of individual and household information therefore the census definition of United Nation in 1958 “A census of population is the total process of collecting, compiling, evaluating, analyzing and

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publishing demographic, economic and social data pertaining at specified time to all person in a country or in a well delimited territory of a country”. This census survey provides not only counting of head but also gives valuable information related to all individual person. Usually census is enumeration of a population, often including the collection of related demographic information. Human geographic defined “ A census is an official periodic count of a population including such information as sex, age, occupation, etc. This is official counting of a region’s or nation’s people and compilation of economic, social and other data also Free Math Dictionary defined “ The census is uses, of example, and standardized test’ model question of higher level difficult related to the census, reference to related terms and tools, Usually for formulation of development policies and plans and demarcating constituencies for election. It is the traditional entails canvassing the entire country to collect information on each individual residing within the country’s borders. It provides the “sharp shot” of the entire population residing within the country at a fixed time. Census. According to the information regarding the characteristics of each individual residing within a country is collected at a specific time and the activity is repeated at regular intervals. Population and housing census has defined “A population census is the total process of collecting, compiling, evaluating, analyzing and publishing or otherwise periodic. Disseminating demographic, economic and social data pertaining, at a specified time, to all person in a country or in a well delimited part of a country. Census as a total process of collecting, processing, tabulating and publishing of demographic, social and economic data pertaining, to a specified time, to all persons usually living in the country, Well-delimited part of the country. According to business dictionary. “ A census is general: official counting of a region’s or nation people and compilation of economic, social and other data, usually for formulation of policy, and next define the oxford dictionary (British & World) .

A census is the process of collecting information about every member in a population, it include every member in a selected population and provides statistical information about the population of country, ratio of different gender number of employed people, total number of educated people etc. The United Nation define the of housing census” A housing census is the total process of collecting, compiling, evaluating, analyzing and publishing or otherwise disseminating statistical data pertaining, at a specified time, to all living quarters and occupants thereof in a country or in a well delimited part of a country (p.7)”. However, according to the "UN (2008), a modern census has four main essential features." Individual enumeration, universality, simultaneity, and determined periodicity are among the traits. The census's universality is defined by its coverage of

a whole country or area. Its simultaneity is focused on a certain temporal frame. The census is helping to transform global economic, social, and demographic knowledge. Recognizing the significance of global population censuses, the United Nations backed a world population census program in 1960 and again in 1970. According to the CBS-2003, one of the primary conditions for permitting the operation is the legal provision. The CBS is required by the data Act of 2015 to collect, consolidate, publish, and evaluate data. The government may issue a notified order directing the collection of data on any topic, according to the Act. It is a country's complicated, large-scale, and big statistical activities that need a significant amount of resources. This might be one of the reasons why many nations conduct censuses every five years, or even every ten years. Nepal, like many other nations, conducts population censuses every 10 years.

Historical Background of Census: According to the census history of the world noted by (NCOC), The Sumerians began counting people for revenue purposes five thousand years ago. The practice of tax-focused counting then spread to Babylonia (4000 B.C.), China (3000 B.C.), Rome (2500 B.C.), Palestine, India, and Egypt. Gradually, censuses were used to assess population fitness for military duty and to count the general population when food supplies were scarce. In contemporary times, the census was first conducted in Quebec in 1666 and in Sweden in 1749. The census in the United States began in 1790 and was repeated every 10 years thereafter. The 1841 census in the United Kingdom is considered the first modern census, as it recorded names, ages, and genders individually. Location and profession. Previously, censuses were primarily concerned with the number of state security employees for rationing purposes. The population estimate was subsequently judged necessary in order to begin socioeconomic development infrastructure construction. The 1951 UK census was used to collect information such as birthplace, marital status, and so on. Employment status was introduced in 1981, whereas fertility and death statistics were first recorded in the 1911 census. In the modern era, most European countries began conducting censuses in the nineteenth century. In 1872, a census was held across Asia, including the Indian subcontinent. In 1881, Australia undertook the first simultaneous census of the whole continent. In the twentieth century, many more countries began to conduct censuses. Recognizing the need for a census for the good of the country and its people is a recent phenomenon in emerging countries. Emerging-nation population growth rates surged throughout the second half of the twentieth century, resulting in overpopulation and rapid resource depletion. One of the most significant difficulties appears to be population growth.

Historical perspective of population census in Nepal over hundred years

Nepal performed its first population census in 1911, and since then, population censuses have been performed every ten years, with the most recent being in 2021. Nepal's population census has a 100-year history. A historical time in terms of the amount of experience acquired. The population is the number of people who live in a specific region or territory at any one moment. Population of any place is always dynamics due to birth, death and migration. Out of these three processes birth and death are natural and universal process that take place universally irrespective of physical location caste ethnicity religion, state of development and so on. The third aspect, migration is not natural but has been another important factor that brings change in population size, composition and other attributes in the place of origin and place of destination of migrants. Several aspects of population such as size, growth, distribution, density and mobility are the common phenomenal that posses several opportunities and constraint to resource and infrastructure planning and development.

Objective

The overall objective of this paper is to find out the population structure and spatial distribution based on 1911 to 2021 censuses results.

Methodology and Data Source

This paper almost based on 1911 - 2011 censuses and also especially focus on 2021 census data. This paper was designed is descriptive and analytical method. Nature of the data is secondary source by the collection of CBS for census reports and data sheet. This paper try to explore the causes and consequences of increasing and decreasing trend of the population size, structure, growth and distribution in different intercential periods.

Results and Discussion

Population Size and Growth Rate

Population growth refers to the change in the number of people living in a certain area over time. Nepal's population has been expanding over time. From 1961 to 2001, it rose dramatically. Nepal's first population census, held in 1911, revealed a population of 5.6 million, which grew to 8.2 million in 1952/54. .Table 1 shows that there were 23.1 million in 2001, 26.4 million in 2011, and 2.91 million in 2021. In Nepal's most recent twelve demographic censuses.

Table 1: Population size and growth rate in different census 1952/54 to 2021.

Census Year	Total Population	Annual Growth Rate	Doubling time	Density	Sex Ratio
1952/1954	8256,625	2.27	31	56	96.8
1961	9412996	1.64	42	64	97.0
1971	11555983	2.05	34	79	101.4
1981	15022839	2.62	26	102	105.0
1991	18491097	2.08	33	126	99.5
2001	23151423	2.25	31	157	99.8
2011	26494504	1.35	52	180	94.2
2021	29,164,578	0.93	-	198	95.9

Source: CBS 2003, 2014 & 2021.

Population growth rate was negative in the census of 1920 and 1930 and it may be due to the involvement and heavy casualties of Nepalese army in the First World War and the worldwide influenza epidemic. More over the period of 1920-1930 were not normal due to the war and thus there might be under counting the population. However, the growth rate become positive since 1941/42 (i.e. 1.16 %) and when compared to prior periods, between 1941 and 1952/54, the annual population growth rate was 2.27 percent. Following 1952/54, it was recorded as 1.6 percent in 1961, 2.05 percent in 1971, 2.26 percent in 1981, 2.08 percent in 1991, and 2.25 percent in 2001. It indicates that the population growth rate grew by more than 2% every year between 1971 and 2001. However, according to the 2011 census, the growth rate has dropped dramatically to 1.35 percent, and if present growth rates continue, in 2011, it will take 52 years to double the population. (Table 1). Similarly, overall population of Nepal as of the census day (25 November 2021) is 29,164,578, with 14,253,551 men (48.87%) and 14,911,027 females (51.13%). As a result, the sex ratio is 95.59 men for every 100 females. In 2011, the overall population was 26,494,504 people, .94.16 percent of the population is male. In 2011, the overall population was 26,494,504 people, with a male-to-female ratio of 94.16.

Not only the national growth rate of population has increased, it has been wider spatial variation in the pattern of population growth rate by Ecological Zones. The growth rate of Tarai is highest in each census and that also exhibit in 2021 with 1.56 percent of growth rate followed by hill and mountain Zones with 0.29 percent and -0.02 percent respectively. There is also sharp variation in the population growth pattern by district. Bhaktapur has the greatest annual average population growth rate (3.35%), while Ramechhap has

the lowest (-1.67%). Thirty-two districts, all of which are mountain and hill, have seen negative growth rates ranging from - 1.67 to - 0.10 percent over the previous two decades. Similarly, 25 districts have substantially higher growth rates ranging from 1.03 to 3.35 percent. At provincial level the population growth rate per year is lowest in Gandaki province (0.30%) for the period 2011 - 2021 and highest in Lumbini province (1.25%) for the same time. In addition to the population growth rate, household size has lowered, and the population doubling time has been extended until 2021.

The summarizes of this data clearly shows that population size smoothly increased but the population growth rate is rapidly decreasing (0.93%) as well as sex ratio also decreasing trends because people orientated to the small family size. Similarly, international migration flows are also high. So, mostly active and reproductive age of people are migrated in different countries according to their choices either to gain education or earn money. In these reasons, contraceptive prevalence rate was also stable before three demographic health survey in modern method (43% in NDHS 2011, 2016 & 2022).

Spatial Distribution of Population

It represents the relationship of human habitant to their physical boundaries. In other words, it is the degree of concentration of people in any area. The pattern of population distribution is uneven in Nepal. Factors such as the environment, history, sociocultural, demographics, economics, politics, and development all have an influence. In this study, the population's spatial distribution is analyzed by ecological zone and development region. The most and least inhabited districts, as well as the missing people, are found in urban and rural regions.

Nepal has three ecological zones: mountain, hills, and Tarai. Out of those three ecological regions with in the last 50 years both Mountain and Hill regions have continuously loosed 0.23 percent and 3.11 percent of the total population and Tarai has increased day by day its percentage to total population by almost 17.6 percent in the period. Table 2 indicates that Mountain and Hill shared the 6.09 percent and 40.25 percent and Tarai 53.66 percent of the total population in 2021 census. Tarai has always been the host region, with a population that has risen from 43.6 percent in 1981 to 50.3 percent in 2011 and 53.7 percent in 2021. This demonstrates a significant regional variance in population distribution and implies that the plain region has the highest population concentration. Agricultural land and work possibilities remain the primary reasons for people migrating from the mountains and hills to the Tarai.

Table 2: Population Distribution by ecological region 1981-2021

Census Year	Region			Total Population
	Mountain	Hill	Tarai	
1981	1302896 (8.7%)	7163115 (47.7%)	6556828 (43.6%)	15022839
1991	1443130 (7.8%)	8419889 (45.5%)	8628078(46.7%)	18491097
2001	1687859 (7.3%)	10251111(44.3%)	11212453(48.4%)	23151423
2011	1781792 (6.7%)	11394007(43.0%)	13318705 (50.3%)	26494504
2021	1778104 (6.09%)	11748548(40.25%)	15665828 (53.66%)	29,164,578

Source: CBS 1995, 2003, 2014 & 2021.

Table 3 shows the percentage distribution of population by province levels from 2011 to 2021. It is focuses on population distribution is also uneven by province levels i.e. the Bagmati province holds highest percentage of population followed by Madhesh, Koshi, Lumbini, Sudur Pachhim, Gandaki and Karnali provinces, respectively. According to the 2021 census, the Bagmati Province is home to more than one-fifth of Nepal's population (20.87%), whereas the Gandaki Province is home to less than ten percent (9.07%). It has seen a rapid growth in Bagmati province mainly because of being a capital city and get more opportunities.

Table 3: Population Distribution by province levels and Rural/Urban Residence 2011-2021

Province levels	Census Year				Residence, 2021 (%)	
	2011		2021		Rural	Urban
	Number	Percent	Number	Percent		
Koshi Province	4534943	17.12	4972021	17.03	37.68	62.32
Medhesh Province	5404145	20.40	6126288	20.99	27.13	72.86
Bagmati Province	5529452	20.87	6084042	20.84	22.64	77.36
Gandaki Province	2403757	9.07	2479745	8.49	34.29	65.71
Lumbini Province	4499272	16.98	5124225	17.55	44.96	55.04
Karnali Province	1570418	5.96	1694889	5.81	47.90	52.10
Sudur Pachim Province	2552517	9.63	2711270	9.29	37.72	62.28
Nepal	26494504	100.0	29192480	100.0	33.91	66.08

Source: CBS, 2014 & 2021.

Population distribution is also uneven by rural and urban area. After the re-structured in 2015 of Nepal, at present there are 753 declared local levels, only 293 municipalities or urban areas and rest of them are rural municipalities. Although Nepal's urban population remains modest, it is rapidly growing, expanding from 6.4 percent in 1981 to 9.2 percent in 1991, 13.9 percent in 2001, 17.07 percent in 2011, and finally 66.08 percent in the 2021 census. It is important to note that besides the declared urban locality, there are many settlements having urban characteristics. Thus the urban population will rapidly increase in the near future. Moreover the existing town such as Kathmandu, Lalitpur and some emerging towns in Kathmandu valley and other regional, district headquarters will also be the magnet in pulling population. There will be a rapid shift of population from rural to urban area in future.

The highest and lowest populated districts

Since the 2021 census, the number of districts has remained steady at 77. However, there were major changes in district area between 2011 and 2021, and boundary modifications occurred for certain districts in 2021. As a result, before the 2011 to 2021 census, population distribution by district was not strictly comparable. Tables 4 and 5 indicate the percentage of districts with the greatest and lowest population distributions. In 2001, the five districts with the greatest population size were Kathmandu (4.67%), Morang (3.64%), Rupandehi (3.06%), and Jhapa (2.97%). In the 2001, 2011, and 2021 censuses, the percentages increased. With minor changes to the order, the bulk of the districts stated above retained their position as the district with the largest population size. Danusha slipped out of the top five in 2001, while Kailali took her position in 2011. Sunsari was also replaced by Kailali in the 2021 census in 2011. Apart from Kathmandu, the Tarai region contains the most populated districts.

Table 4: Five Most Populated Districts 2011-2021

S. N	2001			2011			2021		
	District	Population	% of total Population	District	Population	% of total Population	District	Population	% of total Population
1	Kathmandu	1081845	4.67	Kathmandu	1744240	6.58	Kathmandu	2017532	6.91
2	Morang	843220	3.64	Morang	965370	3.64	Morong	1147186	3.93
3	Rupandehi	708419	3.06	Rupandehi	880196	3.32	Rupandehi	1118975	3.86
4	Jhapa	688109	2.97	Jhapa	812650	3.07	Jhapa	994090	3.41
5	Dhanusha	761364	2.90	Kailali	775709	2.93	Sunsari	934461	3.20

Source: CBS 1995, 2003, 2014

Ten Least Populated Districts in 2001-2021

The five least populated districts are ten mountain districts. These districts are same from 2001-2021 the exception are the Jumla and Mugu replaced Rasuwa and Humla by that came into the least populated districts in 2011 and 2021 not only the mountain districts but also the hill districts came into the least in 2021 as given in Table 5. The five least populated districts shared 0.02 %, 0.05 %, and 0.15%, 0.16%, and 0.19 % of the total population in the census 2021, respectively. These districts not only reducing the percent of population but importantly also reducing the absolute number as well.

Table 5: Ten Least Populated Districts in 2011-2021

S. N	2001			2011			2021		
	District	Population	% of total Population	District	Population	% of total Population	District	Population	% of total Population
1	Manang	9587	0.04	Manang	6538	0.02	Manang	5645	0.02
2	Mustang	14981	0.06	Mustang	13452	0.05	Mustang	14596	0.05
3	Dolpa	29545	0.13	Dolpa	36700	0.14	Dolpa	42959	0.15
4	Humla	40595	0.18	Rasuwa	43300	0.16	Rasuwa	45554	0.16
5	Mugu	43937	0.19	Humla	50858	0.19	Humla	55496	0.19

Source: CBS, 2014 & 2021.

The highest and the lowest populated districts and their increasing and decreasing percentage of population to the national total needs immediate policy attention that the eastern and central Tarai and Kathmandu districts are increasingly population, however, the mountain and hill districts losing its population day by day.

Density

The number of individuals per square kilometer of land area is used to measure population density. It is a useful metric for measuring population strain on land. Because of this spatial pattern of population concentration, variation has also observed in population density. The average population density has been increased from 102 in 1981, 126 in 1991, 157 in 2001, 180 in 2011 and 198 in 2021 census. However, there is regional variation as population density; Mountain has only 34 persons per square km followed by Hill with 192 and Tarai 461 in 2021 census. This is mostly due to people migrating from the mountains and hills to the Tarai (Table 6). The density distribution also differs between rural and urban areas.

Table 6: Population Density by Ecological Zone and Rural Urban Residence 1991-2021

Ecological Region	Population Density by Year (Person/sq. km)			
	1991	2001	2011	2021
Mountain	27.85	32.57	34.0	34
Hill	137.25	167.11	186.0	192
Tarai	253.58	329.59	392.0	461
Nepal	125.63	157.30	180.0	198

Source: CBS 1995, 2003, 2014 & 2021.

In 2021, the population density (number of people per square kilometer of land) is 198, up from 180 in 2011. The Tarai region has the highest population density (460) while the Mountain region has the lowest (34). Kathmandu district has the greatest population density (5,169) while Manang district has the lowest (3). Similarly, similar range has been noted at several province levels, with the Madhesh province having the highest population density (636 people per square km) and the Karnali province having the lowest (61 people per square km). Among the 77 districts, Kathmandu has the greatest population density (5108 people per square km) and Manang has the lowest (3 people per square km) (CBS, 2021).

Population Growth Rate

The most significant indication of population structure is the growth rate. It also predicts future population patterns. In 2021, the annual average population growth rate is 0.92 percent. In 2011, this rate was 1.35 percent. In ecological belt, the highest population

growth rate is Tarai (1.56%) and lowest in Mountain region. By the province levels, Lumbini province is the highest growth rate (1.25%) and followed by Medhesh province. the lowest population growth rate is Gandaki province. Bhaktapur district has the greatest annual average population growth rate (3.35%), while Ramechhap has the lowest (-1.67%).

Table 7: Population Growth Rate by Ecological Zone and Province Levels 1991-2021

Ecological Region	Population		Annual Growth rate	Change in 10 years	
	2011	2021		Number	Percent
Mountain	1781792	1778104	-0.02	-3688	-0.21
Hill	11394007	11748548	0.29	354541	3.11
Tarai	13318705	15665828	1.56	2347123	17.62
Nepal	26494504	29192480	0.93	2697976	10.18
Province Level					
Koshi Province	4534943	4972021	0.88	437078	9.64
Medhesh Province	5404145	6126288	1.20	722143	13.36
Bagmati Province	5529452	6084042	0.92	554590	10.03
Gandaki Province	2403757	2479745	0.30	75988	3.16
Lumbini Province	4499272	5124225	1.25	624953	13.89
Karnali Province	1570418	1694889	0.73	124471	7.93
Sudur Pachim Province	2552517	2711270	0.58	158753	6.22

Source: CBS 1995, 2003, 2014 & 2021

Conclusion

This article focused on the size, growth and spatial distribution of the Nepalese population especially based on 2021 census. As of the 2021 census, Nepal's population was 29174578, about 2.6 million higher than in 2011, with an annual growth rate of 0.93 percent lower than the 1.35 percent growth rate reported in 2011. Among three ecological zones and 7 provinces, Tarai and Lumbini province has recorded highest population growth rate i.e 1.56 percent and 1.25 percent, respectively and lowest in mountain region and Gandaki province i.e 0.02 percent and 0.30 percent during the period 2001-2021, respectively. Likewise, the highest population growth rate is found in Bhaktapur districts (3.32 %) and lowest in Ramechhap (-1.65 %). Internal migration and the outflow of migrant workers overseas for various reasons resulted in negative population growth in hilly and mountain

areas over the previous decade.

Nepal has an uneven population distribution pattern. The Tarai area has 53.6 percent of the overall population, while the hill and mountain regions have 40 percent and 6.7 percent, respectively. The Bagmati province is home to more than one-fifth of the country's population. It might be because the Kathmandu Valley is included in this section. The national population density is 198, up from 180 in 2011. The highest population density is found in the Tarai area (461.0 people per square km) and the lowest in the mountain (34.0 people per square km), in addition, Kathmandu district has the highest population density (5108 people per square km) while Manang district has the lowest (3 persons per square km).

Overall, Nepal's population growth rate has slowed throughout the inter-census period (2011-2021), perhaps due to lower fertility and death rates, as well as an increased outflow of migrant workers. Unmanaged internal and international migration has had a considerable impact on population geographical distribution and density.

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