Statistical Trends in Literacy Rates in Nepal

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Abstract: *The history of education system is not so long in Nepal. The common Nepalese people did not get the formal education at the time of Rana regime. At that time, education system of Nepal was in a very deprived condition. After democracy (1951), the new democratic political system made provision for education for common Nepalese people. Since then, Nepal has targeted to increase the literacy rate along with education attainment of the common people in each short term and long-term development plans. The main aim of this study is to analyze the literacy rate in Nepal based on sex, place of residence, development zone and geographical region. It is found that the rate of increase of literacy is 10.64% in each census year over the last 70 years where as male literacy is increased as 11.27% and female literacy is increased as 8.09 % at the same time duration. It also found that there is no any evidence to infer that average of literacy rate differ among the five development regions (p value > 0.05).It is believed that the findings of this paper may facilitate planners and decision makers for formulating policies and programs regarding development of education sector of nation.*
Keywords: *Analysis of variance, Literacy rate, Trend analysis.*

I.   Introduction

There are no collective definitions and standards of literacy. Unless otherwise specified, all rates are based on the most common meaning- the capability to read and write at a specified age. In the earlier censuses of Nepal, literacy is defined as the ability to read and write. Since the population census 1991, the definition of literacy is re-defined and it incorporated the ability to read and write with understanding and to perform simple arithmetic calculation [1]. Information of literacy does not give a perfect measure of education outcomes. Low level of literacy and education can hinder the economic development of a country in the current rapidly changing technology-driven world. Literacy plays highly affirmative role in promoting and preserving peace; contributing to the building of peaceful, comprehensive and prosperous nations.

Whereas Nepal has made important progress in the last decade, there is still a significant literacy gap between male and female. According to the most recent Nepal Standard Survey, Nepal has an adult literacy rate of 56.6 percent, with a huge variation between males and females. Now, Nepal ranks fourth in SAARC region in the literacy rate, behind Maldives (95 %), Sri Lanka (92.5%) and India (74.04%). The government spends an average of Rs 26.52 billion per annum in the sector. However, around 35 percent of Nepalese are still illiterate [2].

According to the National Population and Housing Census 2011, despite free education up to grade 10 and regular adult literacy campaigns, only 15.7 million of 23.9 million children above five years of age became literate by 2011. Primary education has the highest share in literacy, accounting for 39 percent for the total literate population of Nepal, followed by the secondary level, contributing 20.3 percent. The share of School Leaving Certificate (SLC) graduates and above is 10.2 percent each. The data also illustrate that just 4.2 percent of the people went through non-formal education. However, the Non Formal Education Centre claims that some four million people between the ages of 15 to 60 are illiterate. The census report shows that female literacy has gone up by 15 percent to 57.4 percent, while the male literacy rate climbed by just 10 percent, rural literacy increased by around 10 percent in the same period. The same rate is now 62 percent. According to the census report the annual increment in literacy rate is 1.18 percent. The literacy rate of males is at 75.1 percent while it is 57.4 percent for women. Similarly, the highest literacy rate is in Kathmandu with 86.3 percent and lowest in Rautahat with 41.7 percent. Of the country's total population, Terai constitutes of 50.27 percent while hilly and mountain areas constitute 43 percent and 6.73 percent respectively [3].

Education is the first step in the way of development process and it provides the basis for the improvement of the socio-economic condition of a country [4]. There are various empirical studies related to importance of literacy rate for development of nation. Some of them are: Desai [5] pointed importance of literacy in India's economic growth. Rehman et al. [6] explain the province-wise literacy rate in Pakistan and its impact on the economy. Fuller et al. [7] clarified the importance of early literacy in northeast Brazil. Similarly,

Rahman et al. [8] researched on literacy program and non formal education of Bangladesh and India. Rahman and Uddin [9] stated that education is a fundamental need of all human beings and crucial to any country's development. By keeping a view of this reality, the study tries to analyze the literacy rate in Nepal based on sex, place of residence, development zone and geographical region. It may facilitate planners and decision makers for formulating policies and programs regarding development of education sector of nation.

II. Materials and Methods

The present study is analytical as well as descriptive in nature. All analysis and discussion have been based on published sources of secondary data such as National Population and Housing Census[3], Population Census[10], Population Monograph [1,11] Statistical Pocket Book [12] Nepal in Figure [13] and Preliminary Results of National Population Census [14],Statistical Year Book [15], Nepal Population Reports [16]. Software tool which is used is SPSS package. Some descriptive statistics such as standard deviation, coefficient of variation, skewness, kurtosis, percentage, bar diagram and pie diagram are used to analyze trend and pattern of literacy rate of Nepal. The inferential statistics like One Way ANOVA (Analysis of Variance) is used to test whether the mean literacy differs among the five development regions as well as three ecological belts.

$$F = \frac{MSC}{MSE} \tag{1}$$

Where MSC =Mean sum square due to column and MSE = Mean sum square due to error.
Variance - ratio test is used to test whether the variances of male and female literacy are equal or not.

$$F = \frac{S1^2}{S2^2} \qquad if\ S_1^2 > S_2^2 \tag{2}$$

$$F = \frac{S2^2}{S1^2} \qquad if\ S_2^2 > S_1^2 \tag{3}$$

Where S_1^2 is the variance of first series and S_2^2 is the variance of second series.
Chi- square test of independence of attributes is used to test whether the current literacy rate of male and female is associated with urban/rural area, ecological belt and development region.

$$\chi^2 = \sum \frac{(O-E)^2}{E} \tag{4}$$

Where O = Observed frequency and E= estimated frequency.
Trend analysis by least square method is used to analyze the trend of literacy rate based on gender, development region, ecological belt and urban/ rural area. A simple linear trend by least square analysis [17] is in the form of:

$$Y = \beta_0 + \beta_1 X + \varepsilon_t \tag{5}$$

Where Y is called response variable X is called predictor variable and ε_t is measurement error with mean= 0 and standard deviation =1, β_0 is Y-intercept and β_1 is rate of change which can be calculated as:

$$\beta_1 = \frac{\sum_{i=1}^n (x_i - \bar{x})(y_i - \bar{y})}{\sum_{i=1}^n (x_i - \bar{x})^2} \tag{6}$$

$$\beta_0 = \frac{\sum_{i=1}^n y_i - \beta_1 (\sum_{i=1}^n x_i)}{n} \tag{7}$$

III. Results and Discussions

The literacy rate in Nepal is analyzed on the basis of sex, development zone, geographical region and place of residence (rural/urban area). The discussions of current literacy rate of population based on urban/rural area, development zone, ecological belt and age- sex composition are also mentioned below.

3.1 Literacy trend in Nepal (6 years and above) by Sex
The following table shows the literacy rate of male, female and total population from census year 1952/54 to 2011.

Table 1: Literacy trend in Nepal (6 years and above) by Sex

Census Year	Male	Female	Total
1952/54	9.5	0.7	5.3
1961	16.3	1.8	8.9
1971	23.6	3.9	13.9
1981	34	12	23.3
1991	54.5	25	39.6
2001	65.5	42.8	54.1
2011	71.6	44.5	65.9
Trend line(Yc)	39.33+11.27X	18.67+8.09X	30.14+10.64X

Source: CBS, 1995, 2003, 2011.

Table 1 shows that very low level of literacy in 1952/54, Nepal has a significant progress in increasing literacy over the year. The census of 2011 has indicated that currently the literacy rate among the population of 6 years or above in Nepal is 65.9 percent with male literacy rate of 71.6 percent and female literacy rate of 44.5

percent. However, there is still huge variation between male and female**.** There is strong evidence to conclude that the variances of literacy rate of male and female are equal (Variance Ratio Test, $F_{cal} = 1.707 < F_{0.05 (6, 6)} = 4.28$).
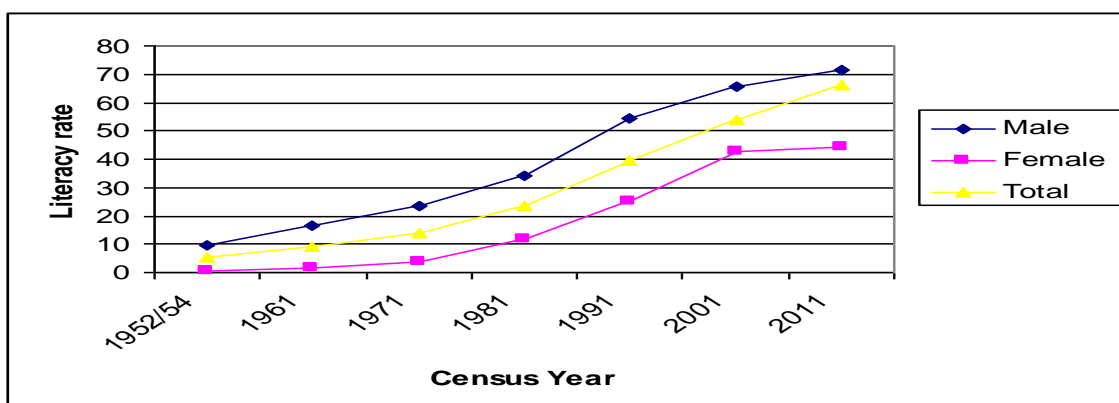

Figure 1: Literacy trend in Nepal (6 years and above) by Sex

Figure 1 shows that there is still a significant literacy gap between male and female. The gap is gradually increased though the census year 1952/54 to 2011.Regarding the education system of Nepal, women are still backward from different perspectives despite the introduction of several rules and regulations, plans and policies to increase the women literacy rates [18].

3.2 Literacy rate in Development Region
Nepal is divided into five administrative development regions like eastern, central, western, mid-western and far-western regions. The following table shows the literacy rate on the basis of development region from the census 1971 to 2011.

Table 2: Literacy rate in Development Region

Year	E.D	C.D	W.D.	M.W.D	F.W.D
1971	15.3	14.2	16.5	08.7	09.6
1981	27.4	22.7	25.8	16.4	17.3
1991	44.3	38.6	44.0	31.8	32.2
2001	55.7	52.9	59.3	49.4	48.7
2011	67.1	63.9	70.9	64.2	63.5
Trend line(Yc)	41.8+13.19X	38.46+12.96X	43.3+14.3X	34.1+14.4X	34.26+13.92X

Source: CBS, 1995, 2003, 2011.

Table 2 shows that literacy rate in eastern region is 15.3 in 1971 but it is 67.1 in 2011. In central development region, it is changed from 14.2 to 63.9 through the census year 1971 to 2011. In western development region, it is changed from 16.5 to 70.9 through the census year 1971 to 2011. In mid western region, it is increased from 8.7 to 64.2 through the census year 1971 to 2011. In far western region, it is increased from 9.6 to 63.5 through the census year 1971 to 2011. There is no any evidence to infer that average of literacy rate differ among the five development regions [One way ANOVA, $F_{cal} = 0.189 < F_{0.05, (4,20)} = 2.87$ or Sig. value (0.941) > α (0.05), thus do not rejecting H_0].
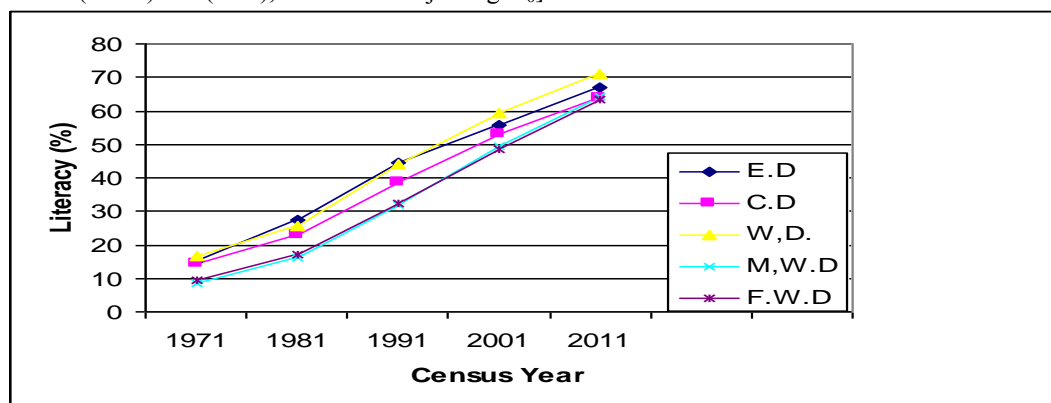

Figure 2: Literacy rate in Development Region

Figure 2 shows that most of the census year, the literacy rate is the highest in the western development region but least in the mid and far western regions.

3.3 Literacy rate in Ecological Region
Ecologically, Nepal is divided into three regions, running east to west. They are the Mountain, the Hill and the Terai. The following table shows the literacy rate on the basis of ecological belts from the census 1971 to 2011.

Table 3: Literacy rate in Ecological Region

Census Year	Mountain	Hill	Terai
1971	9.9	14.8	13.6
1981	18.0	24.9	22.5
1991	33.2	43.9	36.5
2001	43.5	58.6	51.3
2011	60.45	72.33	61.15
Trend line (Yc)	33.01+12.66X	42.90+14.88X	37.01+12.39X

Source: CBS, 1995, 2003, 2011.

Table 3 shows that literacy rate is increased from 9.9 to 60.45 during the four decades in mountain region. Similarly, it is changed from 14.8 to 72.33 in the hilly region. In the terai region, it is increased from 13.6 to 61.15 at same time. There is no any evidence to infer that average literacy rate of population differ among the three ecological regions [One way ANOVA, $F_{cal} = 0.276 < F_{0.05, (2,12)} = 3.89$ or Sig. value (0.941) > α (0.05), thus do not rejecting H_0].
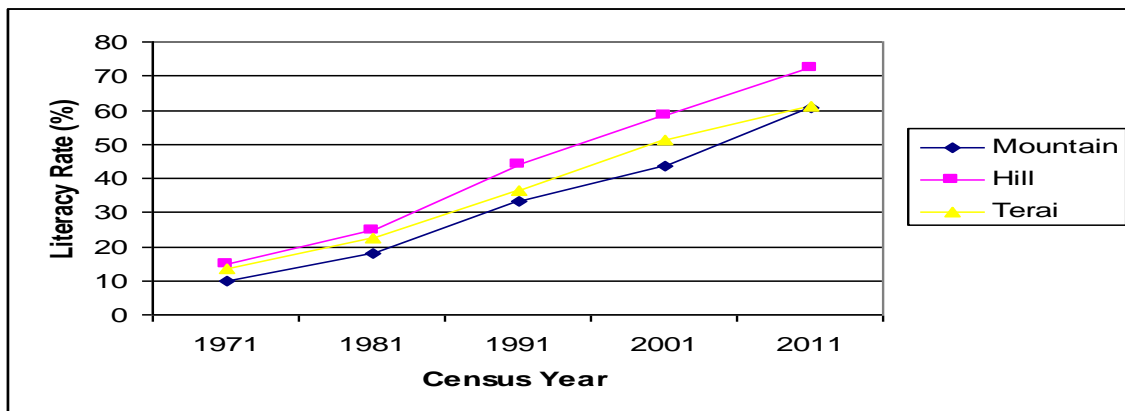

Figure 3: Literacy rate in Ecological Region

Figure 3 shows that the literacy rate is the highest in hilly area as compared to terai and mountain thought the census 1971 to 2011. The literacy rate in terai area is higher than mountain from the census year 1971 to 2011.

3.4 Literacy rate in Rural and Urban Areas
On the basis of residency, Nepal is divided into two parts: rural and urban area. In rural area, according to National Population and Housing Census 2011, 17% of total population resides in urban areas and 83% in rural areas. The literacy rate in rural and urban area from census year 1981 to 2011 is shown in the following table 4.

Table 4: Literacy rate in Rural and Urban Area

Census Year	Rural area	Urban area
1981	21.4	50.5
1991	36.8	66.9
2001	51.0	71.9
2011	62.49	84.22

Source: CBS, 1995, 2003, 2011.

Table 4 depicts that, in rural area, the literacy rate is increased from 21.4 to 62.49 through the census year 1981 to 2011. Similarly, it is increased from 50.5 to 84.22 through the census year 1981 to 2011 in the urban area. There is strong evidence to conclude that the variances of literacy rate of rural urban area are equal (Variance Ratio Test, $F_{cal} = 1.622 < F_{0.05 (3, 3)} = 9.28$).
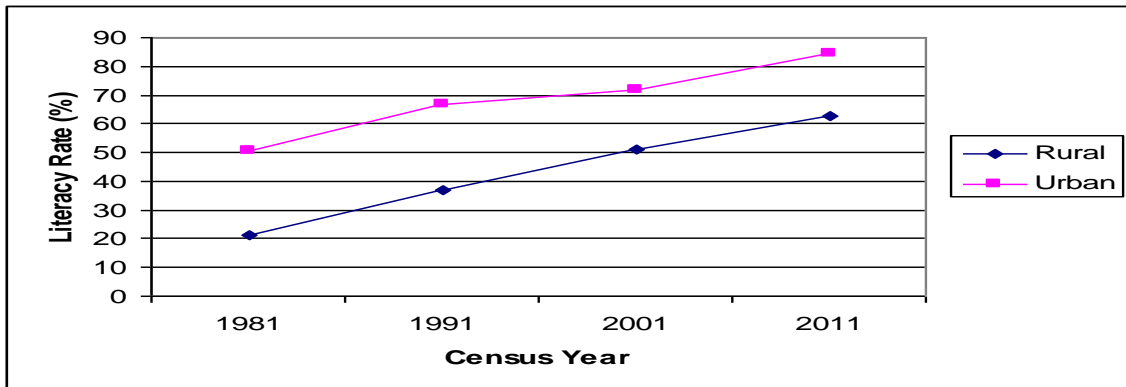
Figure 4: Literacy rate in Rural and Urban Area

Figure 4 shows that there is still a significant literacy gap between the people residing in rural and urban area. The gap is gradually decreased from the census year 1981 to 2011.

3.5 Current Scenario
According to National Population and Housing Census 2011, the following table shows the current scenario of literacy rate of Nepal on the basis of place of residence, ecological belt and development zone.

Table 5: Current Scenario of Literacy Rate

		Male	Female	Total
Place of Residence	Urban	89.01	75.19	84.22
	rural	71.98	53.82	62.49
Ecological Belt	Mountain	71.61	50.09	60.45
	Hill	81.42	64.14	72.33
	Terai	70.34	52.35	61.15
Development Zone	Eastern	75.99	59.01	67.12
	Central	72.64	56.69	63.92
	Western	79.90	63.37	70.98
	Mid-western	73.56	55.65	64.20
	Far-western	73.37	51.93	63.48
Total	Nepal	75.1	57.4	65.9

Source: National Population and Housing Census 2011, CBS

Table 5 shows that the total literacy rate of Nepal is 65.9 where as male literacy trate is 75.1 and female literacy rate is 57.4. The literacy rate in urban area is 84.22 where as male literacy rate is 89.01 and female literacy rate is 75.19. In rural area, the literacy rate is 62.49 but male literacy rate is 71.98 and female literacy rate is 62.49. In mountain region, the literacy rate is 60.45 but male literacy rate is 71.61 and female literacy rate is 50.09. In the hilly region, the literacy rate is 72.33 but male literacy rate is 81.42 and female literacy rate is 64.14. In terai region, the literacy rate is 61.15 but male literacy is 70.34 and female literacy rate is 52.35. In eastern development region, the literacy rate is 67.12 but male literacy is 75.99 and female literacy rate is 59.01. In central development region, the literacy rate is 63.92 but male literacy is 72.64 and female literacy rate is 56.69. In western development region, the literacy rate is 70.98 but male literacy is 79.90 and female literacy rate is 63.37. In mid western development region, the literacy rate is 64.20 but male literacy is 73.56 and female literacy rate is 55.65. In far western development region, the literacy rate is 63.48 but male literacy is 73.37 and female literacy rate is 51.93. There is no any evidence of relationship between the literacy rate of gender and place of residence ($\chi^2 = 0.238 < \chi^2_{(0.05, 1)} = 3.841$). There is no any evidence of relationship between the literacy rate of gender and ecological belt ($\chi^2 = 0.270 < \chi^2_{(0.05, 2)} = 5.991$). Similarly, There is no any evidence of relationship between the literacy rate of gender and development zone ($\chi^2 = 0.208 < \chi^2_{(0.05, 4)} = 9.448$).
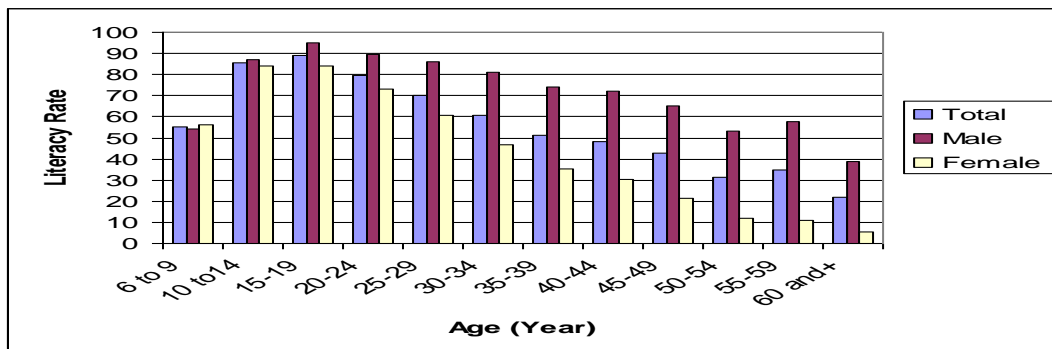
3.6 Literacy rate by Age and Sex
According to National Population and Housing Census 2011, the following table shows the current scenario of literacy rate by age and sex.

Table 6: Current Scenario of Literacy Rate by Age and Sex

Age group(Year)	Total	Male	Female
6-9	55.2	54.2	56.0
10-14	85.8	87.3	84.3
15-19	88.9	94.8	84.1
20-24	79.5	89.8	73.1
25-29	70.1	86.2	60.5
30-34	60.7	81.2	47.0
35-39	51.2	74.3	35.1
40-44	48.2	72.0	30.2
45-49	43.0	65.4	21.6
50-54	31.2	53.3	12.0
55-59	34.7	57.7	11.1
60 and+	22.1	38.7	5.3
CV	38.96	24.60	65.49
Skewness	-0.403	0.176	0.139
Kurtosis	-0.865	-1.402	-1.055

Source: Nepal Living Standard Survey, 2010/11, Vol.1, CBS.

Table 6 shows the current population of male is more literate than female except the age group 6-9 year. In the total current population, the highest literate population lies in the age group 15-19 year. The coefficient of variation of total literate population is 38.96%, skewness is -0.403 and kurtosis is -0.865. It means that the literacy rate of total current population negatively skewed and platykurtic in nature regarding to age distribution. In the current male population, the highest literate population lies in the age group 15-19 year. The coefficient of variation of male literate population is 24.60 %, skewness is 0.176 and kurtosis is -1.402. It means that the literacy rate of male current population positively skewed and leptokurtic in nature regarding to age distribution. In the current female population, the highest literate population lies in the age group 10-14 year. The coefficient of variation of female literate population is 65.49 %, skewness is 0.139 and kurtosis is -1.055. It means that the literacy rate of female current population positively skewed and platytkurtic in nature regarding to age distribution.

Figure 5: Current Scenario of Literacy Rate by Age and Sex

Figure 5 shows that current population of male is more literate than female except the age group 6-9 year.

IV. Conclusion

The current country's literacy is 65.9 percent in 2011 from 54.1 percent in over the last ten years. Nepal government has been allocating a lot of budget on the education sector every year, so the result is not satisfactory by the cause of traditional basis educational plan. Nepal is still far behind countries like Maldives and Sri Lanka where literacy rate is almost 95 percent. Out of the 129 countries across the globe, Nepal stands at the 111th position in terms of education, which reflects Nepal government gives low strategic priority to develop the education sector. Although, Nepal has made important progress in the literacy during the last decade, but there is still significant difference between the male and female literacy. Female literacy in rural, mountain and far western region is lower than other regions. The current population of male is more literate than female except the age group 6-9 year. The lowest rate of change of literacy is in mid-western and far-western development region in comparison to others. In developing countries, female education reduces fertility and infant mortality, while increasing children's education. Gender inequality in education directly and significantly affects economic growth [19]. Therefore, Nepal government should give the priority to increase the female literacy as well as literacy of marginalized group of population.

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