District Level Fertility Differentials and Population Growth of Assam

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Abstract—Fertility refers to actual reproductive performance, applied to an individual or a group. This work makes an attempt to examine the effect of religion on fertility especially Hindu-Muslim fertility differentials in Assam. The Complete Fertility Rate of women is computed by Parity Progression Ratio for each district of Assam. Another attempt has been made to investigate district disparities in the growth of population in Assam. The relevant data are drawn from population Census.

Keywords—*Education, Fertility, Growth of Population, Parity.*

I. INTRODUCTION

Fertility may be defined as the number of live births that a woman produces during her reproductive span; otherwise, it is the child-bearing activity of a population. Fertility refers to the actual production of children. Only a particular section of the females has the capacity to bear children viz. females belonging to the age group 15 to 49. Further, it is to be noted that only live births are to be taken into account while measuring fertility as it is only a live birth which accounts for increase in population. Fertility is the single most important determinant of population dynamics and growth. Fertility control is the most important way to check high population growth. It is directly influence by a set of sociology and biological factors. The factors such as women's age, education level, age at marriage, economic status and religious attitudes etc., are often called intermediate fertility variable. The age at marriage has been observed as an important factor associated with high fertility. Child mortality moves directly to the fertility. Women's age is always observed as directly related to fertility and early marriage increases her reproductive span, and the absence of appropriate family planning, can result in children explosion. The term religion plays an important role in determining the attitude of the people in limiting the fertility. Religion disparities also play an important role in declining or increasing fertility. The term Total Fertility Rate (TFR), Literacy Rate and Parity Progression Ratio (PPR) are also the important factors to determine fertility.

Table-1: Population Growth, Crude Birth and Death Rate and Literacy Rate of India 1901-2011.

Year	Population (in million)	Annual Average Growth Rate (percent)	Crude Birth Rate	Crude Death Rate	Literacy Rate
1	2	4	5	6	7
1901	238.4	-	45.8	44.4	5.35
1911	252.1	0.56	49.2	42.6	5.92
1921	251.3	0.03	48.1	47.2	7.16
1931	279.0	1.04	46.4	36.3	9.5
1941	318.7	1.33	45.2	31.2	16.1
1951	361.1	1.25	39.9	27.4	18.33
1961	439.2	1.95	41.7	22.8	28.33
1971	548.2	2.2	41.2	19.0	34.45
1981	683.3	2.22	37.2	15.0	43.57
1991	846.4	2.14	32.5	11.4	52.21
2001	1028.7	1.97	24.8	8.9	65.38
2011	1210.2	1.64	21.8	7.1	74.04

Source: Census and SRS reports of India.

Also, it is seen that Crude Birth Rate have reduced from 24.8 in 2001 to 21.8 in 2011.Also, the Crude Birth Rate for Rural is 23.3 and for Urban is 17.6.Similarly, the Crude Death Rate for urban is 5.7 and 7.6 is for rural. Again, Crude Death Rate has gone down from 8.9 in 2001 to 7.1 in 2011according to census report [4]. Hence we may say that literacy has a negative and statistically significant effect on death rate. Also, higher female literacy reduce death rate.

The literacy rate for country as a whole increased to 74.04 percent from 65.38 percent with male and female literacy 82.14 percent and 65.46 percent respectively. Literacy gives the best indication about the socio-economic development of a society. According to census of India 2011, it is seen that, in the year 1951 the literacy rate of female for Assam was 7.58 whereas for India it was 8.86. Also, the density of population of the State has gone up to 397 as against India's density 382 as per 2011 Census. The term decadal growth in an important factor of population growth analysis. The following figure shows the decadal growth rate of Assam and India.
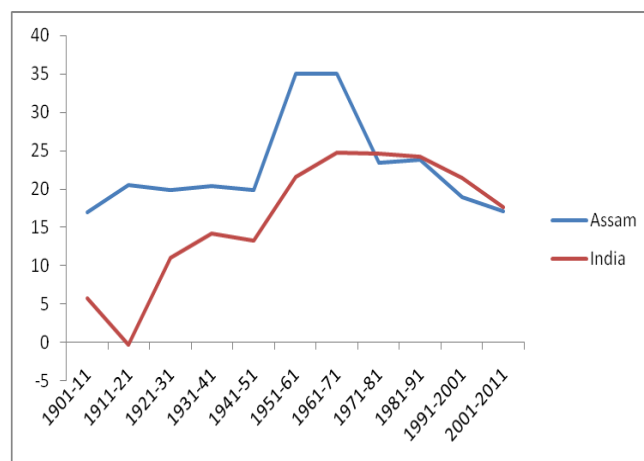

Figure-1: Decadal Growth of Population of Assam and India (In Percentage)

A. Distribution of Population by Religious Groups

Religious profile of the population is an important demographic feature noticeable from the first Census in 1872 till now. In the year 1971, the percentage of Hindu populations for the districts like Dhuburi, Kokrajhar, Dhemaji districts are 34.8, 76.2, 98.9 and for the year 2011 it is downward trend i.e.19.92, 59.63, 95.87.According to religious profile of the total population of India in 2011, Hindus slide from 80.5 % to 79.8 % and Muslims climb from 13.4% to 14.2%.This showing the highest surge in the rate of growth at 24.6 % as against Hindus at 16.8 %. The Muslim rate of growth is higher than

that Hindu. Almost 60 % to 65 % of Muslims live in the Northern states like Assam.

During the last several decades, the proportion of Muslims in India's population has been steadily increase and the proportion of Hindus steadily falling. The growth rate has been consistently higher for Muslims than for Hindu in all intercensal decades. The percentage increase during 1951-61 and 1961-71 were 20.29 and 23.72, respectively, for Hindus and 25.61 and 31.2, respectively, for Muslim in India. The observed differential in growth rates between Hindus and Muslims must be sought in terms of differential in the component of population growth.

Figure2: Population Growth Rate of All India- Assam.

Religion has been quite an important factor in the causation of fertility differentials. The Muslim population of Assam had almost doubled from 12.40% in 1901 to 25.72 % in 1941. Since then, no doubt, Muslim population increased consistently till it reached 34.22 % in 2011. Further between 1941 and 1951, the Muslim population had dropped marginally in percentage terms from 25.72% to 24.68% in Assam. The following figures show it clearly.

Figure 3: Decadal Growth of Assam

From the fig.2, we may say that, though the decadal growth of population for two community of India is in decreasing trend, but for Assam it is not same sign. Also,from the Fig.3 and Fig.4, we have seen that the Hindu community it is in an decreasing order whether for Muslim it is a continuous process.
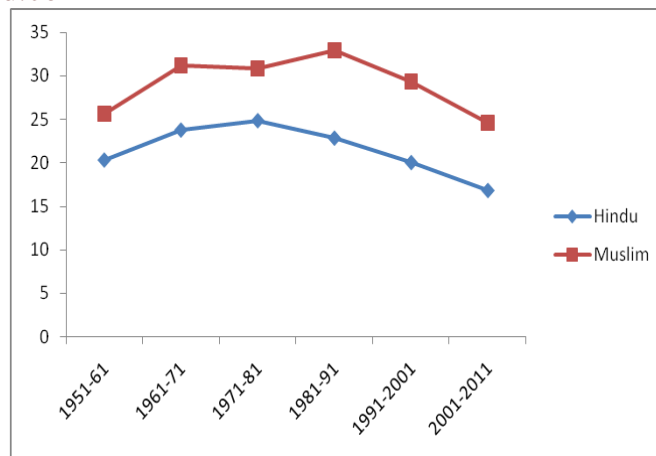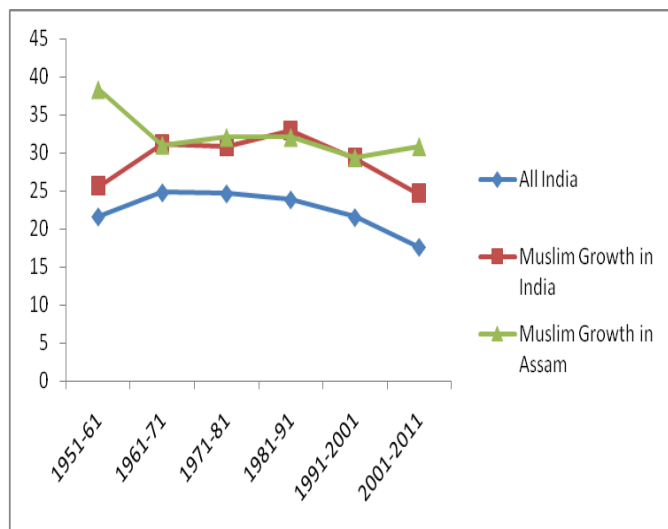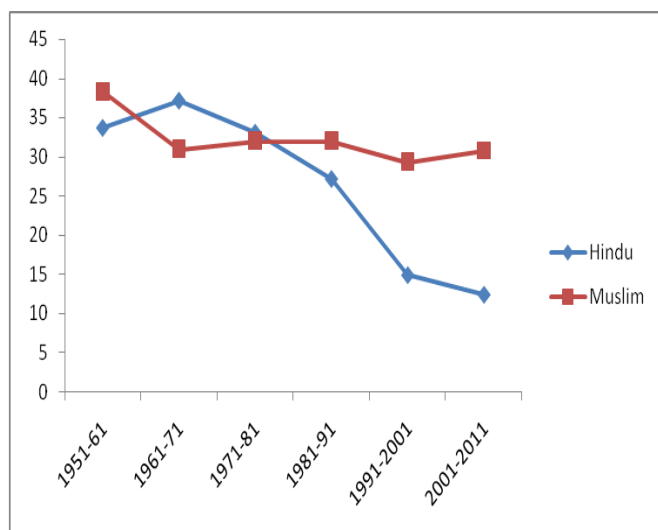

Figure 4: Decadal Growth of India.

In India Muslims have grown by 24.6% and the Hindus by 16.8% in the year 2001 and 2011. The Muslim growth is 46% above that of Hindus and 39% above the national average. This gap is very large. In the decadal growth of the Muslim population of India between 2001 and 2011, the highest in terms of percentage points has been in Assam. Also, seen that the growth rate of Muslims has declined from 29.5% of the previous decade to 24.6% now, but the national average has also declined from 21.6 to 17.7%. The growth rate is alarmingly higher in specific states in Assam. The Gap between Muslim and Hindu Growth Remains High. The decadal decline of Hindus, while that of Muslims is 0.8% on the positive side, which is not small.

In Assam 1971 the Muslims had a share of only 24.57%. But, now the share of Muslims population has risen from 30.92% in 2001 to 34.26% in 2011. Hindus now form less than 80% of the population of the Union. Their share has come down from 80.46% in 2001 to 79.80% in 2011.According to population census 1991 and 2001, there was only four and six districts were Muslim majority districts in Assam. Till now it is goes up to nine districts. They are accordingly- Dhuburi, Bongaigaon, Goalpara, Barpeta, Darrang, Nagaon, Morigaon, Karimganj and Hailakandi.

Assam, being a Hindu majority state, fears that it will become Muslim-dominated state. The demography as a whole in the world are concerned with understanding the fertility behavior and the term fertility is related to the population projection. Female education could be an important influencing variable in fertility transition among the Muslims. There are already indications that several districts of Assam have shown a very low rate of growth, while Muslim dominant districts like Dhubri, Goalpara, Barpeta, and Nagaon in lower Assam, and also Hailakandi in Karimganj have grown at a much higher rate than the average of the state. The process of demographic change and of the marginalization of Hindus in Assam has not yet abated. According to population census 2001, religion wise percentage distribution of population, reveals that out of total population in the state Hindu was 64.89 percentage and 30.92 percent were Muslims. During 1971-91 and 1991-2001 the average annual growth of Muslim in Assam was 38.7 and 29.3 respectively. But during this period the growth of other religion was 21.8 and 13.9 only and also corresponding estimated average natural growth rate of Assam was only 19.6 and 18.7. Therefore, it is seen that the growth of Muslim population are inordinately high in Assam during 1971-2001. In 1901 in Assam, out of total population in the state Hindu were 69.22 percentage and only 9.5 percent were Muslims. But, in 2011 census report it is seen that 61.46 percentage Hindu and 34.22 percent are Muslims. Also, it is

seen that the highest growth of population at the district level is Dhubri which is 79.67 for Muslim and 19.92 for Hindu.

B. Slow and Steady Fertility Decline in Assam

Fertility is usually measured as the total fertility rate (TFR), which equals the average number of births a woman would have if she were to bear children in each year of her life at the same rate, as did women of that age in the year the TFR is calculated.TFR of Assam has dropped consistently between 2001 and 2012, i.e. from 3.0 to 2.4 (SRS 2001–2012). The TFR of Assam is currently 2.4 children per woman (SRS, 2012). According to RGI Population Projections (2006), Assam is likely to achieve replacement-level of fertility (i.e. 2.1) by 2019.Growth of population in an area basically depends on births, deaths and net migration of people during the period under consideration. Estimate of births is possible only when the estimates of fertility parameters of the population are available.

C. Inter District Disparities in Literacy Rate

In Assam the growth of literacy has shown an encouraging sign. Literacy gives the best indication about the socio-economic development of a society. As per as Census report 2011, literacy rates for urban and rural areas are found at 88.47 percent and 69.34 percent respectively. The literacy gap found in rural and urban areas is 12.3 and 6.9 respectively.

According to Census report of 1991 and 2001 Jorhat district registered the highest literacy rate among the districts at 65.51 and 77.91 respectively. On the other hand, the Dhuburi [9] district reported the level at 38.36 and 49.86 respectively. The female literacy rate of Jorhat district is the highest among the districts of Assam in both the Census years of 1991 and 2001at 56.88 and 72.54 respectively in contrast to Dhuburi, which recorded the least rate at 28.79 and 42.64 respectively. Again, in the year 1951 the literacy rate of female for Assam was 7.58 whereas for India it was 8.86. But, in the year 2011 it is reverse, that is the literacy rate of female for Assam was 67.27 and for India it was 65.46. The literacy rate for Hindu and Muslim are 66.4 percent and 46.7 percent accordingly. Female education has a high influence on decreasing in their fertility.

Literacy is related to the total fertility rate (TFR). Total fertility rate is one of the key components in population projections. Here, TFR for rural and urban are estimated based on census data 2011. It is the average number of children a woman would bear if she survived through the end of the reproductive age span, and experienced at each age the age-specific fertility rates of that period.

Table 2: Literacy Rate and Total Fertility Rate (TFR) of Assam.

Districts	Rural		Urban		Female Literacy
	Literacy	TFR	Literacy	TFR	
Kokrajhar	63.63	3	87.86	2.3	59.54
Dhuburi	55.25	4	82.28	2.8	54.26
Goalpara	65.93	3.9	76.08	3.1	64.53
Barpeta	61.47	3.6	86.28	2.3	59.04
Morigaon	66.60	1.8	84.17	2.4	64.99
Nagaon	69.96	3.7	86.34	2.4	69.21
Sonitpur	64.98	3	81.65	2.4	62.53
Lakhimpur	76.22	3.2	86.93	2.4	71.91
Dhemaji	71.81	3	84.02	2.5	62.13
Tinsukia	65.05	3	82.08	2.8	63.54
Dibrugarh	72.75	2.8	88.00	2.4	69.52
Sivasagar	79.27	2.8	90.92	2.5	75.69
Jorhat	80.01	2.6	72.50	1.6	78.22
Golaghat	75.94	1.4	91.74	2.1	72.18
Karbi-Anglong	66.69	1.6	87.37	2.7	64.62
Dima-Hasao	71.13	3.8	92.24	2.9	72.15
Cachar	77.08	3.5	87.39	2.6	74.62
Karimganj	76.66	4.3	92.82	3	73.49
Hailakandi	72.73	3.9	92.93	2.8	68.54
Bongaigaon	66.42	1.8	87.37	2.5	65.18
Chirang	62.08	3.2	81.28	2.2	57.87
Kamrup	74.21	3.1	87.89	2.2	67.69
Kamrup (M)	76.45	2.7	90.77	2.1	85.82
Nalbari	77.22	2.7	89.89	2.9	73.85
Baksa	69.18	2.7	74.54	1.9	62.23
Darrang	61.50	3.8	85.92	2.4	60.4
Udalguri	64.43	3	85.14	2	59.17

All the major religions in Assam except Muslim have literacy rates higher than the nation average. What is more alarming is that the literacy rate among the Muslim women is very low. As per the 2001 census, the female literacy rate among the Muslims was a mere 50.1%, far below than the national average. It is a common knowledge that the population growth rate is always higher among the illiterate people. It is believed that the female literacy rate play a key role in the growth of population. Female education can be expected to reduce family size. According to ranking of districts based on data 2001, the Jorhat district has the highest literacy rate and the district Dhuburi has lowest literacy rate. Again, according to census report 2011, the Kamrup Metro has the highest literacy rate i.e. 88.71. and the district Dhuburi has lowest female literacy rate i.e 54.26 The percentage of Hindu TFR is declined in lower Assam districts Dhuburi, Darrang, Morigaon, Nagaon and Cachar respectfully. Also, the districts Kokrajhar, Dhuburi, Goalpara, Kamrup, Darrang, Bongaigaon and Nagaon are in continuation of high Muslim TFR than Hindu. Hence, from the above analysis we can say that where female literacy rate is height, in that region total fertility rate is low. In rural areas, the influence of female education on fertility little important in both the religion, but in urban areas this is not always true. Female education has a high influence on the decrease in their fertility. Also, the impact of standard of living index on fertility for Muslim women is more pronounced in urban areas than rural areas. So, we conclude that, female education is an important instrument through which fertility behavior can be changed in the long run.The Parity Progression Ratio is the one of the measurement of fertility analysis.

II. METHOD OF ANALYSIS

A. Parity Progression Ratio (PPR)

Parity Progression Ratio (PPR) is the probability of having another child given that the mother has reached certain parity. Parity Progression Ratio [3] describes the probabilities that a person in that cohort who had i children will proceed to have an (i+1) child.

PPR is obtained with the following procedure:

- Tabulate the women by parity.
- Obtain the number of women who have reached parity by cumulating the figure from bottom up.

- Divide adjacent figure to obtain the probability.

In their form, PPR may be computed as ratios of the number of births of adjusted orders in a current year. The formulae may then be given as follows:

$$a_{i} = B_{i+1} / B_{i}$$

Where, B_i represent birth of a given order in some year and B_{i+1} are birth of the next higher order in the same year. In a more refined form, PPR may be computed for birth cohorts and may make allowances for marriage and the different intervals between the births of different parities. In another form, the rates are based on the proportions of married women who have had children of a particular order and above.

The PPR a_i would then be defined as follows:

$$a_o = m_{1+} \qquad \text{……..………(1)}$$
$$a_1 = m_{2+}/ m_{1+} \qquad \text{………………(2)}$$
$$a_i = m_{i+1}/ m_{i+} \qquad \text{……………..(3)}$$

where m_{1+}, m_{2+}, …, m_{i+} are the percent of married women in a given year who have had 1 or more, 2 or more, …, i+1 or more children and where a_0, a_1, …, a_i are the "probabilities d'agrandissement" of the families with 0 (without children), 1 child, …, i children, or, in general, the probabilities that a family will enlarged by an additional child each year. The probabilities are calculated only for cohorts of women who have reached the end of the child bearing period.

B. Complete Fertility Rate (CFR)

The Complete Fertility Rate for the birth cohort (1961-1965) of women is computed by PPR for each district of Assam based on 2011 census data. At first the women are tabulated by parity. These figures are then cumulated from the bottom to give the number of women with at least 'n' children ever born. Lastly, adjacent figures are divided to give the probabilities. The CFR of a cohort, which is equivalent of TFR in the period measure, can be expressed as an arithmetic series of products of PPRs. The average number of children ever born to women in a birth cohort may be expressed as:

$$CFR = a(0) + a(0)a(1) + a(0)a(1)a(2) + a(0)a(1)a(2)a(3) + \ldots + a(0)a(1)\ldots a(n)$$

where, a (0) is just the proportion of women in the cohort who become mothers.

III. RESULTS AND DISCUSSION

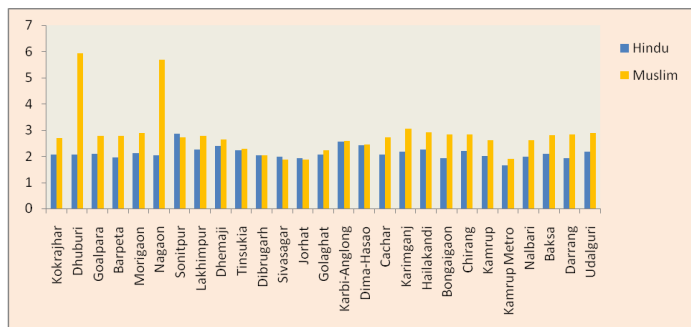The Complete Fertility Rate of two communities of Assam is presented in Fig-5.

Fig-5: Complete Fertility Rate for Hindu-Muslim of Assam.

It is seen from the above figure that in Dhuburi district the complete fertility rate is highest, i.e. fertility is high. It is also clear that except the three upper Assam districts, all others district the Muslim Complete Fertility Rate (CFR) is high.

From the analysis we may say the parity is high among the Muslims than Hindu.

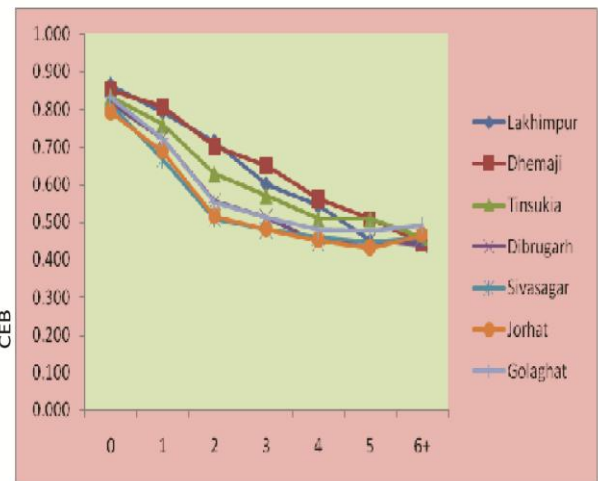The following figure shows the Parity Progression Ratio (PPR) for two communities.

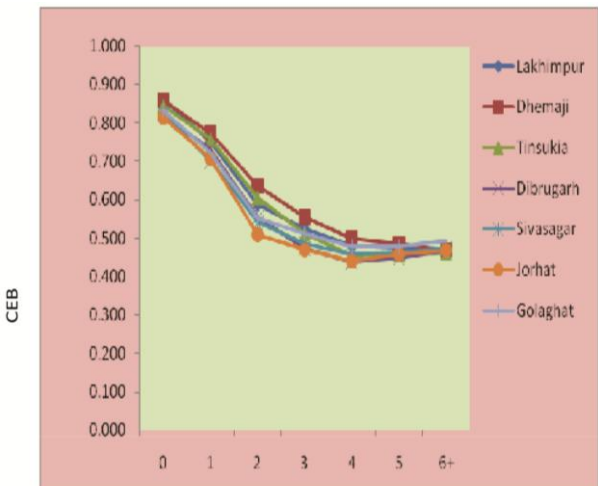Figure6(a): PPR for Muslim of Assam (upper)
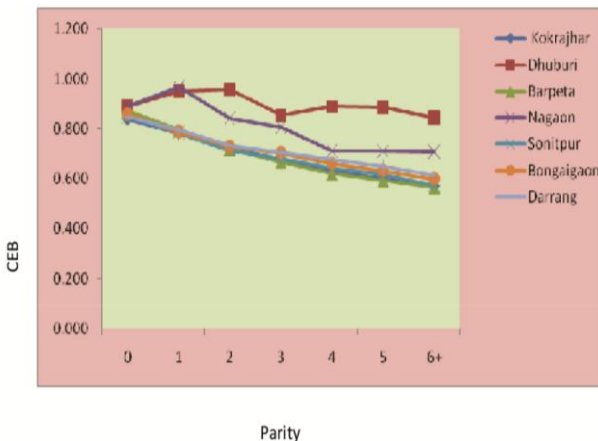

Figure 6(b): PPR for Hindu of Assam (upper)
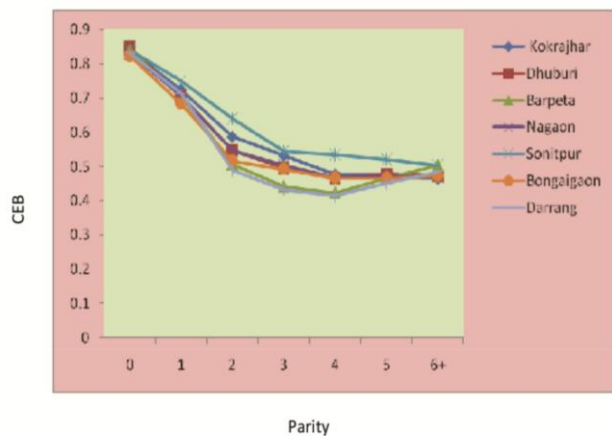

Figure 6(c): PPR for Muslim of Assam (lower)
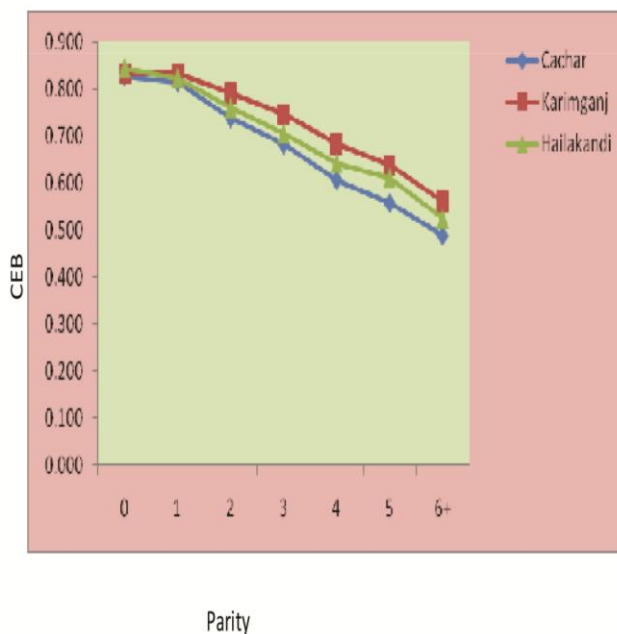
Figure 6(d): PPR for Hindu Assam (lower)
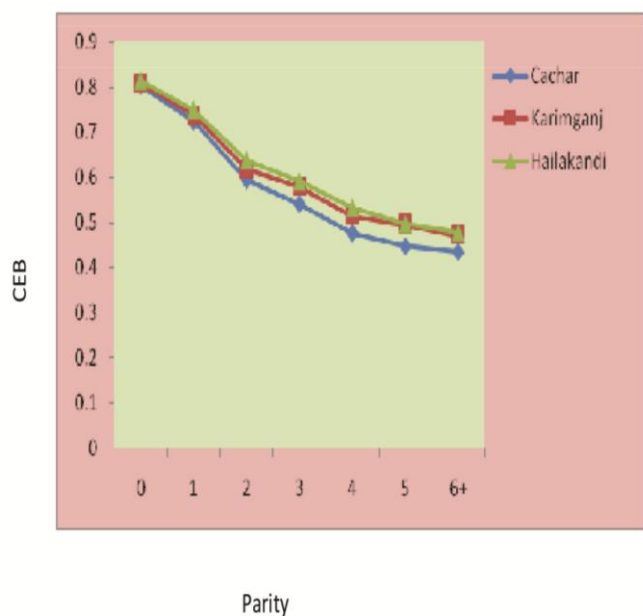

Figure 6(e): PPR for Muslim of Assam(Barak Valley)

Figure 6(f): PPR for Hindu of Assam(Barak Valley)

From the above figures we have seen that the selected districts of upper Assam, parity for Hindu is in downwards than Muslin community. Similarly, PPR for lower Assam, the Dhuburi district has higher parity than the others. Again, if we see, the PPR for Barak Valley for Muslim, then we may say that in Cachar district the parity is high but for Hindu is not

same. So, there is an inter district variations of total fertility rate, female literacy rate and Parity Progression Ration, which affects on fertility patterns. Because the term fertility is related to the population growth. Hence, it is clear that fertility is correlated with the factors like Total Fertility Rate, Complete Fertility Rate, Parity Progression Ratio.

CONCLUSION

From the above analysis, it shows that the population of Muslim is growing at a steady rate. Since, despite a rise in the Hindu population, their percentage has gone down. Also, it is observed that Hindus are decling particularly in Assam very significantly, showing a dangerous signal for the future. Abnormal increase of Muslim's population observed to be a serious issue. One of the main reasons behind the abnormal growth of the Muslim population in Assam is early marriage i.e. legal age at marriage, higher birth rate, lack of family planning, etc. TFR of Muslims are significantly higher than the Hindus. Because in the intercensal growth of Muslims is a continuous process. So, for that Parity Progression Ratio and Complete Fertility Rate is high. Also, the impact of female education in reducing fertility is more pronounced for Hindu as compared to their Muslim counterparts. It is widely believed that Muslim-Hindu differences in fertility behaviour are related to the lower autonomy of Muslim women. Hence, from the above analysis it is observed that there is a close relationship between Total Fertility Rate, Literacy Rate, Parity Progression Ratio and Complete Fertility Rate.

Critical Concerns:

- Decline of the Indigenous People and Growing Tensions in Assam. There has been a sharp decline in the share of Hindus in the total population of Assam.
- The rate of growth of Muslims and the national average has remained high gap and unchanged.
- There has been a significant rise in the share of Muslims in the population of Assam in conformity with a continuing and worrisome long-term trend.
- The early marriage i.e. below legal age at marriage of the Muslim women and the lack of family planning among them are the signs of their social, economic and educational backwardness.
- The growth of share of Muslims in the total population has been observed to be much higher than the national average, indicative of the development of several predominantly Muslim pockets.

References

[1] Bhagatp, R. B., Raharaj, Urujitp . Hindu-Muslim Fertility Differentials, *Economic and Political Weekly,* January 29, 411-418, 2005.
[2] Borooah.Vanik,Yer, Riyal. Religion, Literacy, and the Female-to-Male Ratio, *Economic and Political Weekly,* 419-427, January 29, 2005.
[3] Borah. S., Borah, M. Fertility, Parity Progression Ratio and Population Growth of Assam : A Statistical Analysis. International Journal for Research in Applied Science Engineering Technology (IJRASET). Vol.4, No.VII, pp. 214-221, 2016.
[4] Census report of India, Government of India, 1991, 2001 &2011.
[5] Guilmoto, Christophe. Z, Rajan. S. Irudaya. *District Level Estimates of Fertility from India's 2001 Census.* Economic and Political Weekly February 16, 2002.

[6] Hussain.N., Abbas. Md. Zahir and Owais, Saba. Muslim in West Bengal: Trend of Population Growth and Educational Status. *Islam and Muslim Societies: A Social Science Journal,* vol.5, no.1, pp.39-57, 2012.

[7] James. K S, Nair. Sajini. B. *Accelerated Decline in Fertility in India since the 1980s Trends among Hindus and Muslims,* Economic and Political Weekly, January 29, 2005.

[8] Ponnapalli. K.M, Ram. F. Religious Taxonomy of status and Districts in India: An Analysis using SID of Religion. *IIPS Working Paper. 2*, July,2010.

[9] Sheikh.Md. M. *Population Growth And Proverty Among The Muslim of Dhuburi District of Assam. International Journal of Science, Environment and Technology,* vol.3, no.6, pp.2269-2283, 2014.

[10] *Statistical Hand Book Assam*. Directorate of Economics and Statistics, Assam, Guwahati, 2012, 2013 and 2014.