**A Longitudinal Study of Selective Gender Preferences in India: Investigating the Influence of Female Literacy on Gender Ratio**

**Abstract**

 **Purposes:** The main objective of the study is to examine the impact of literacy and illiteracy on the selective birth choices among females in Jammu and Kashmir. Moreover, the study also aims to identify the factors or drivers other than literacy and illiteracy that compel females to exercise selective options.

**Theoretical Framework:** The study has been devoted to studying the forces that restrict the growth of the population, especially the birth of a girl child, which earlier population theories like Malthus and Neo Malthus have examined. Accordingly, the present research works on the fact that literacy and illiteracy have a significant role in containing population growth.

**Design Methodology:** The Study used longitudinal data and examined the relationship and interdependence between literacy and population growth in selected regions of the state using parametrical statistical measures including simple Karlpearsons’s correlation and bivariate regression analysis.

**Findings and Recommendations:**

The analysis of the study revealed that literacy is a dominant factor for selective birth decisions across the rural and urban regions among all groups of inhabitants and families. Nevertheless, the phenomenon is significantly visible in the literate class, and this appears primary reason for the adverse sex ratio in the state. Moreover, the study hints that the advanced medical screening process to determine the gender of the fetus is not yet a valid procedure to know the type of sex of new birth. accordingly, the study states that the gender of the fetus can not be known in advance exactly, and literate women should not rely on this.

**Research, Practical and Social Implications:** The study is confined to the state of Jammu and Kashmir and can be helpful for policy design at the state and national level for the larger benefit of society at large. It can also guide researcher to chase and underline moments in the socio-cultural and economic domains of life of people and societies.

**Key Words**: Population, Gender, Sex Ratio, Literacy rate, gender preference, infanticides

**Introduction**

India is sure to be the world’s next most populous nation. It will take over China in a couple of years because of high fertility and the growth rate of the population. Although there is a visible improvement in the health, education, and housing condition of people in India in terms of a fall in death and birth rate, rise in literacy, and housing conditions. However, these changes have not raised the overall quality of life of people in the region. The socio-economic structure of the country is still dominated by orthodox and dogmas understanding and pushes people to resort to selective gender preferences, especially by elite educated classes. Gender Preference is a major socio-cultural and economic issue that nations and societies across the world are facing. Gender preference is an innate choice that females lull and adopt all possible human and medical interventions to have the gender of their desire. Gender preference is somewhat not unlike misconceived option chosen by females, however, a deliberate and conscious decision pursued based on a pre-examined socio-cultural and economic paradox. The research of Wood et. al, (1997) reveals that there are multiple integrated factors which collectively influence parents to prefer male children over female children only to have future financial benefits and avoid psychological costs. The problem- gender preference is prevalent much bigger in proportion in the developing world than in affluent societies. A growing body of research has shown that preference for sons was more prevalent in Southern Asia, Western Asia, and Northern Africa, Egypt, Nepal, and China. In contrast, in the other research study of the 28 countries in sub-Saharan Africa, sons preference was seen in 16 countries. These findings demonstrate that preference for sons was not predominant across countries, and daughter preference was common in many countries. However,  among the countries from South East Asia region, a strong preference for sons has been observed in India, China, and South Korea. Although, past research has underlined socio-economic factors pushing females for selective births, however, there are many other demographic changes equally responsible for leading gender preferences.

Demographic change is an inevitable phenomenon. It is a major indicator of economic progress and backwardness, depending upon the stage in which a nation is passing. Demographic change is the byproduct of multiple socio-cultural forces that shape people’s behavior to actions leading to demographic change. Rightly, demographic change can’t be stopped altogether. However, its directions can be moved to suit the interests of a nation through appropriate demographic policy interventions. Today, a sizable number of countries are witnessing demographic change . According to one estimate, around four billion have been added since 1950, and this trend is likely to persist in the future, potentially reaching 10 billion by the close of the twenty-first century. It is predicted that by 2070, the world's population will surge to ten times larger than it was in 1800. The population statistics have recorded new trends (Mohan, 2019). Although, women’s fertility has dropped, life expectancy has swollen, and the ratio of the young population is accentuating. The world is experiencing a somewhat new demographic order. Understandably, many countries today are caught in a demographic challenge including India, China Brazil etc. China is the most populated country in the world, followed by India. The demographic experts opine that India is sure to overtake China in terms of population by 2025 and will be the habitat of around 1.5 billion people by 2030. This phenomenon is in seen even when its decadal population growth in India has pegged down to 1.3 percent from 2.3 percent from 1972 to 1983. Moreover, India enjoys the population dividend today, its 50 percent population is in the age group of 25 years and 65 percent below the age group of 35 years, Despite this favourable population scenario , the average age span of an Indina is somewhat less than what it is for China and Japan. Therefore, the population statistics of India not exhibit an attractive picture on many counts.

 Gender statistics is a profound domain of research involving male and female compositions and sex ratio. Christophe (2007) hints that gender statistics show a balance between male and female proportion, or the number of females against 1000 males. In this context, Suresh (1990 ) says the sex ratio is the number of females available against 1000 males. This ratio varies significantly across states and regions, areas and among and between the age groups depending on the age-specific mortality rates and sex-specific morbidity rates. Nevertheless, from the pre-independence period, the sex ratio in the country has remained adverse for all groups of people and communities and ages, even when the life expectancy has seen continuous upward momentum after the 1920s (Suresh ,1990). This seems mainly due to the favourable impact of socio-economic policies on men rather than women. Accordingly, the sex ratio in India has not seen any major improvement from 933 females to per 1000 males in 1920 to 940 females to per1000 males in 2000. The undesirable sex ratio is not specific to India (Ahire,2024). Many other countries, including China, Taiwan, Singapore and Vietnam, experience a disturbed female and male imbalance. However, for India, a much disturbing fact is that the sex ratio is significantly adverse even for children of below the age of six years and is lowest in the world (Subash, 2023). This vindicates the fact that gender bias is a big culprit that disturbs the demographic landscape of the country and leads to female feticides in the country. in this context, Thomson Reuters Trust Law Women in its recent Survey, reports that India is the most unsafe country for women due to the growing incidence of female infanticides, foeticides, and human trafficking, besides Afghanistan, Congo, and Pakistan. Therefore, to reverse this continuing trend, adequate policy measures need to be put into practice at national and state levels, especially in the state of Jammu and Kashmir, where the composition of sex ratio presents a complex situation mainly due to its culture, religion, socio-economic factors, government regulations etc. This fact has also been confirmed by Christophe (2007). He opines that female discrimination in India is difficult to comprehend. There are many factors involved in it. They are mostly based on social- cultural. political and economic aspects. In this entire argument, advanced medical science is viewed as a primary factor responsible for creating the whole mess against women and deteriorating the sex ratio. Accordingly, the present study is a maiden attempt to underline the myths and facts that contribute to the adverse sex ratio in the state of Jammu and Kashmir

**Literature Review**

Population and demographic changes is an inevitable fact to happen within any nation and across the world. The earlier theories attempted to uncover the facts which according to them may regulate population size commensurate to available resources. Malthus ( 1803 ) the first contender of the domain held that universe is governed by positive checks ( like wars, famine and starvation ) which restore optimum population number in a country. These factors leave no choice on humans to decide about the population size. Nevertheless, the Neo Malthusian camp Paul Ehrlich ( 1968,1971, 1978. 1990 & 2018 ) took complete turn to past doctrine and opined that it is only environment that would determine and regulate population number fit for a nation. He pointed environmental pollution created by affluent people would kill excess population and accordingly balanced size of people would only live and thrive. While Cornucopian (1981) observed that world would never experience food scarcity and as such people may not die for want of food or due to environmental factors. Population would grow and food productivity would also grow. The thought seems more relevant even today and world on one side witness exponential growth in population while on the other side we record consistent rise in food productivity. Therefore, there are other factors that have role in the population transition be medical science or education. These two knowledge domains have made people to think differently with regard to population growth and its associated aspects like gender preferences and choices.

 Gender preferences and selective birth decisions are always complex and have significant impact on demographic panorama of a country. These decisions are more specific and deliberate. They affect population composition, family size, sex ratio and economic growth and human development in the long run. Gender preferences have predominantly impacted global demographic scenario right from late nineteen century which saw grass reversal of whooping population growth during Post-Malthusian Regime. The focus of people has significantly shifted to small family emphasizing sons shall be an essential member of such family. Although, this form of demographic transition has enhanced development opportunities for male kids through education, nutrition, health and other allied socio-economic benefits, however, it instantly disturbed balanced sex order.

The sex ratio is the indicator of number of females available against 1000 males in a particular region. A skewed sex ratio in favor of males has been a major concern since the first census was held in India in1871. The adverse sex ratio of demographic transition is not an exception to India only. However, globally many nations are equally fighting against this adverse demographic change. Majumdar (2013) says that the sex ratio shows the extent of gender-based population equality in a country. The problem of gender-based disorder was initially investigated by Amartya Sen (1990) and subsequently by other researchers, including Dyson and Moore (1983), Ruchi (2018), and of course, UNO. The earlier research has shown that the adverse sex ratio in the post-liberalization era is specifically due to the growth of literacy and the availability of advanced sex-determination medical facilities. Amartya Sen (1990) opines that the social and cultural development of a nation is driven by a balanced sex ratio and high literacy. Similarly Chandna (2015) says “literacy is a vital component of demographic transition and a primary indicator of socio-cultural and economic advancement”. Favouring the argument, Shah (2025) hints that literacy and sex ratio in reality shall have a positive relationship, but in reality move in opposite directions. Similar views have been expressed by the research of Ruchi (2018). She noted that the sex ratio and literacy have a negative relationship. Kumar and Yadav (2018) also hint at similar trends between sex ratio and literacy. Favouring the debate, Bhalotra and Cochrane (2010) have expressed that “women's education disturbs the sex ratio and educated women prefer male babies”. They deliberately abort girl fetuses and retain the male fetuses and have always preference for fewer children (Mayer 1999; Das Gupta and Mari Bhat 1997). Further strengthening the argument the research outcome of Bhalotra and Cochrane (2010; Jha et al (2011); Madan and Breuning (2014) have revealed an adverse sex ratio for literate women, preference for male children, decision to maintain small and nuclear family is a growing trend all across India, specifically in metropolitan cities and urban pockets. “The deliberate aborting of girl fetuses is facilitated by the scientific advancement of medical science and access to prenatal sex determination. Along with the advancement in medical science for prenatal sex determination, the thinktanks and the researchers have identified many other factors like family and dynasty-driven aspects like kinship structures, lineage etc as stimulants for adverse sex ratio” (Dyson and Moore ,1983). Das and Gupta (1987), Krishnaji (1987) Miller (1997) have identified socio economic conditions of the people propel adverse sex ratio in country. The research of Rosenzweig and Schultz (1984); Berik and Bilginsoy (2000) has found that unemployment and underemployment of women and their meager earnings lead to low sex ratio in the country. Likewise, Das Gupta and Mari Bhat ( 1997) ; Jayachandran (2017); Malhotra, Vanneman and Kishor (1995) hint that a decline in fertility contributes to the undesirable sex ratio in the country. The research of Agnihotri, Palmer-Jones, and Parikh (2002) and Kishor (1993) low wage rates for women labour, and inequality of socio-economic conditions spurt low sex ratio Chakraborty (2015).While, the research of Murthi, Guio, and Dreze (1995); Sudha and Rajan (1999) has shown “growth of urbanization, modernity in lifestyle, and female property inheritance blockades or restrictions disturb the sex ratio in the country. In the backdrop of the above literature review, it is evidently clear that sex ratio is a matter of concern in the country”. Besides the many factors, female literacy is a dominant factor for the low sex ratio in India, which may or may not true or consistent in the global context. Therefore, to assess the same in the context of Jammu and Kashmir, the present study has been undertaken

**Objectives**

**The following are the main objectives of the study**

* To examine the relationship between literacy and the sex ratio
* To underline the impact of women literacy on the sex ratio

**Hypothesis**

Null Hypothesis: There is no significant relationship between Literacy and Sex ratio in the state of Jammu and Kashmir.

Alternative Hypothesis: There is a significant relationship between Literacy and Sex ratio in the state of Jammu and Kashmir.

 **Scope of the Study**

The study is longitudinal covering three decades 1990-2021-22 and exclusively specific to the state of Jammu and Kashmir

**Research Methodology**

The study is descriptive and quantitative and is based on secondary data. The data was collected from official records of the Department of Economics and Statistics, Planning and Development, and the Department of Information, including journals, research papers, magazines, and Internet etc. The gathered data pertains to the two main aspects of the demographic domain - sex ratio and literacy. The data collected were tabulated and put into various statistical operations, including correlation, regression, and trend analysis. The Karlpearson’s correlation was used along with simple Fisher’s bivariate regression model. Moreover, time series analysis was applied to draw trends and patterns of the data to derive results and arrive at a conclusion.

**Result Analysis and Discussion**

Demographic transition is profound and swift. It has almost impacted all domains of population composition and economic development of people. The fall in death rate and birth rate has contributed to population explosion and rise in literacy rate led adverse sex ratio. However, apart from these factors, what leads to demographic change has remained a grate challenge to demographic experts to investigate. In fact, past research has documented demographic change as an outcome of many heterogeneous factors around the world, of them literacy has been found a predominant force responsible for a major change in the demographic transition. This is because, education is more enlightening and decisive force which influence and motivates an individual to act and function rationally on the basis of logical and sound edifice of knowledge and reasoning. It has affected the composition of gender matrix- the sex ratio. This has been confirmed by the research of Majumdar (2013); Chanda (2014) and Ruchi (2018). There are number of factors which have led to adverse sex ration in India including in the state of Jammu and Kashmir. Therefore, to study how far the literacy has impacted the sex ratio in the region under study, an analysis and introspection of official data pertaining to the subject has been undertaken hereunder.

**Gender Statistics at All India Level**

The Millennium goal of UNO and of course India’s demographic policy is to attain balanced sex ratio though its demographic policy interventions to alien the same to natural specifications. Nevertheless, the deceit human behaviour has always fiddled with nature for his/her personal gain and disturbed this balanced sex ratio matrix in many regions of the world. The past research (Majumdar,2013) has shown that mostly female deliberately act unevenly and resort to selective births. They overwhelmingly prefer male over the female children. This leads to adverse gender imbalance and demographic disorder. Accordingly, adverse gender statistics is a most sensitive issue for demographic scientists and policy think tanks says Sen (1990). The disturbing gender statistics is seen even by the British administration during pre independence period in many parts of India where male domination has prevailed over women reports Majumdar (2013). Similar facts have been reported by the research of Agnihotri (20000 ; Croll, (2000) and Attane and Guilmoto (2007). While Visaria (1971) has found that usually high mortality levels are prevalent among women of all ages.

 The research of (Yugali et all ,2014 ) has indicated that medical interventions has immensely added to adverse sex ratio in India. In this context, the historical facts show that in some provinces of West India female infanticide was rampantly practised and some affluent cast groups disliked the birth of female baby and were killing them immediately on their birth even before the independence. The demographic plight of female further worsened with the high mortality rate of females between the age group of 0-5 years and brought a worst sex ratio scenario even in the post-independence period as can be seen from the given table below.

 Table No 1- **Sex Ratio at all India Level**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Year | 1901 | 1911 | 1921 | 1931 | 1941 | 1951 | 1961 | 1971 | 1961 | 1991 | 2001 | 2011 | 2021 |
| Sex Ratio | 972 | 964 | 955 | 950 | 945 | 946 | 941 | 930 | 934 | 927 | 933 | 940 | 1020 |
| % fall in Sex Ratio | - | 0.13 | 1.75 | 2.27 | 2.78 | 2.69 | 3,19 | 4.33 | 4.00 | 5.63 | 5,20 | 4.30 | +104.93 |

**Source: DEPS, UT, J &K**

 **Table No 2- Sex Ratio of the Child and Overall population, India, 1951-2021**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Year | 1951 | 1961 | 1971 | 1981 | 1991 | 2001 | 2011 | 2021 |
| Sex Ratio | 100 | 102 | 104 | 106 | 108 | 110 | 112 | 108 |
| Percentage Rise | - | 0.2 | 0.4 | 0.6 | 0.8 | 0.10 | 0.12 | 0.8 |

**Source: DEPS, UT, J &K**

 The adverse sex ratio is vividly visible in the official data depicted in the above table No 1. The data hints that the sex ratio has continuously fallen for more than a century by almost 12 (1972-1960) points from 1901 to 1911. Besides the socio-cultural factors, this decline in sex ratio is significantly attributed to growing literacy among the women in India, coupled with a convenient availability of medical technological intervention to abort the girl foetus. The findings of this study are in tune with the research of Bhalotra and Cochrane (2010) ; Guilmoto (2009); Jha et al (2011) ; Madan and Breuning (2014). These research findings lend a plausible clue that with the growth of female literacy rate although, the quality and standard of family unit in India has improved however, it adversely shifted against female gender preferences. Despite the dismay of adverse sex ratio in the past from 1901- 2011 first time in 2021 sex ratio hints an upward movement to 1020 showing more female than males in India. In this context, it is pertinent to mention that out 201 countries surveyed by UN 125 countries have more females than males, hinting at unbiased growth of female population in India and across the world. The adverse sex ratio in India is also attributed to other factors, including a drop in legal marriage age to 23 years for men and 17 years for women, a fall in fertility rate to 2% and infant mortality 35.2. The position is almost identical in all the states of Indian union as is visible from the table No 3

 **Table NO 3- State Wise Sex Ratio**

|  |  |  |  |
| --- | --- | --- | --- |
| S.NO | State |  Sex Ratio | % Change in Sex RatioFrom 1991 to 2021 |
|  |  | 1991 | 2001 | 2011 | 2021 |
| 1 | Jammu and Kashmir | 927 | 892 | 883 | 883 | -4.75 |
| 2 | Himeachal Pradesh | 896 | 900 | 974 | 974 | +8.70 |
| 3 | Punjab | 882 | 874 | 893 | 893 | +1.01 |
| 4 | Chandigarh | 790 | 773 | 810 | 818 | +1.03 |
| 5 | Uttranchal | 936 | 964 | 963 | 963 | +1.02 |
| 6 | Harayana | 865 | 861 | 877 | 877 | +1.38 |
| 7 | Delhi | 872 | 821 | 866 | 866 | -0.01 |
|  | Rajastan | 910 | 922 | 926 | 926 | +1.01 |
| 9 | Utterpradesh | 876 | 898 | 908 | 908 | +1.03 |
| 10 | Bihar | 907 | 921 | 916 | 916 | +0.09 |
| 11 | Skim | 878 | 875 | 889 | 889 | +0.12 |
| 12 | Andrapradesh | 859 | 905 | 920 | 920 | +1.07 |
| 13 | Nagaland | 886 | 909 | 931 | 931 | +1.05 |
| 14 | Manipur | 958 | 978 | 987 | 987 | +3.02 |
| 15 | Mizoram | 921 | 938 | 975 | 975 | +5.86 |
| 16 | Tripura | 945 | 950 | 961 | 961 | +1.69 |
| 17 | Megalay | 955 | 975 | 986 | 986 | +3.24 |
| 18 | Assam | 923 | 932 | 954 | 954 | +3.35 |
| 19 | West bangal | 917 | 934 | 947 | 947 | +3.27 |
| 20 | Jarkhand | 922 | 941 | 978 | 978 | +6.07 |
| 21 | Orisa  | 971 | 972 | 991 | 978 | +0.72 |
| 22 | Chhatisgrah | 985 | 990 | 930 | 991 | +0.60 |
| 23 | M.P | 912 | 920 | 918 | 930 | +1.97 |
| 24 | Gujrat | 934 | 921 | 618 | 918 | -0.172 |
| 25 | Daman & Dev | 969 | 709 | 775 | 618 | -34.33 |
| 26 | Dada and Nagar Haveli | 952 | 811 | 812 | 775 | -11.93 |
| 27 | Maharashtra | 934 | 922 | 992 | 925 | -1.00 |
| 2 | Andrapradesh | 972 | 978 | 968 | 992 | +2.05 |
| 29 | Karnataka | 960 | 964 | 968 | 968 | +0.83 |
| 30 | Goa | 967 | 960 | 946 | 968 | + 0.00 |
| 31 | Lakshdeep | 943 | 947 | 1084 | 946 | +0.31 |
| 32 | Kerala | 1036 | 1050 | 995 | 995 | -0.40 |
| 33 | Tamil Nadu | 974 | 1001 | 1038 | 995 | +2.10 |
| 34 | Andaman Nicobar | 818 | 846 | 878 | 878 | +7.33 |
| Overall | India | 927 | 933 | 940 | 1020 | +10.03 |

 **Source: DEPS, UT, J &K**

The demographic transition is an out come of multiple factors unfolded by growing literacy of females , urge for small family size, economic status, low earning opportunities for females , male dominated society, low value for female in society, social pitfalls-dowery, modern outlook , quality of work life etc. This transition has pushed mainly by rich and well to do class of society. These segments of society set new trends, standards, benchmarks and styles which other groups of societies copy and emulate especially the poor people and people living in semi urban pockets and villages closer to cities. Consequently, a homogeneous trend with regard to adverse sex ratio is visible all across the states in India as is manifested by the official statistics.

 The state-wise data unfolds that the sex ratio for the majority of the states of the Indian union over the last three decades is not somewhat appreciable. Although the majority of the states have shown a rise in the sex ratio over the last three decades, however, it is still not up to the mark. In many northern states, the sex ratio is pegging below the 900 mark. Nevertheless, it is somewhat appreciable for couple of southern states of India like Kerala, Tamil Nadu, Andrapradesh and Chattisgarh, where the sex ratio is closer to the 1000 mark. Unfortunately, for some northern states like the UT of Punjab, Haryana, and Jammu and Kashmir, the sex ration is 818, 877, and 8883 against 1000 men respectively. The undesirable demographic situation in these states is mainly due distorted sico-economic conditions of people, lack of effective demographic policy, inadequate medical facilities , high mortality, morbidity of children. The states that record a good sex ratio index have advanced medical facilities and utilitarian child development policies in place, which in the long run help them to derive demographic benefits. The research of Ruch (2018) confirmed similar findings in her research and the other studies ( Mujamdar , 2013; Chanda 2014 ) While the other research studies ( Mujamdar , 2013; Chanda 2014 ) “refute the argument by saying there are the number of other factors for low sex ratio ( besides the advancement of medical science for elimination of female fetus)”. The factors include early marriage, low prestige of women in society, dowry, male domination etc. Therefore, the low sex ratio is appears to be an outcome of “Women Neglect Syndrome”. The earlier research of of Agnihotri, Palmer-Jones, and Parikh (2002) and Kishor (1993) confirmed the similar findings. Das Gupta ( 1987) and (Miller ) 1981 report the similar facts.

**Gender Statistics in Jammu and Kashmir**

Notwithstanding to the national level, the state of Jammu and Kashmir has registered a low sex ratio over the last three decades . At the national level the sex ratio has increased from 933 females per 1000 males in 2001 to males 940 females in 2011 and 1021 females in 2021 registering a surge of twenty eight points during the last three decades. In fact, for the first time India’s the sex ratio is moveing closer to the global sex ratio.

Here it is pertinent to mention that the sex ration in the state of Jammu and Kashmir declined from 892 to 833 in 2001 to 2021. At the district level, the four districts namely Leh, Kargil, Rajouri and Bandipora have disturbing sex ratio of 690,810,860 and 899 respectively. Nevertheless, some districts of the state like Kulgam, Shopian, Ananthnag, Doda and Srinagar have somewhat attractive sex ratio 959,927,919 and 900 respectively. These districts appear at par with the national level sex ratio. The low sex ratio is specifically due existence underground sex determination centers operating in these districts. According to one study in 2007 about 13 percent medical centers were engaged in determining the gender specific investigations. Moreover, the study has revealed that pregnant females carried these kind of tests at multiple stage during their pregnancy. The study has underlined around 10 percent female had gone first sex determination test and 30 percent sample respondents had gone the second test and aborted the girl fetus. Further, the study has observed that along with the uncontrolled medical test centers, there are many other factors like dowry, early marriage, two child tradition, social evils against the women, male domination on females and frequent immoral acts against the women, violence against the women etc that significantly contribute to the adverse sex ratio to the state. These findings are in tune with the research of Das Gupta and Mari Bhat(1997); Ruchi (2018) and Kishore (1993).

**Gender Statistics and Literacy**

Gender literacy is a significant challenge in the state of Jammu and Kashmir, as the state has a lower female literacy rate compared to the national average. Literacy refers to the percentage of the population aged seven or above who are able to read and write National Statistical Office (2021). However, the trend of male and female literacy rate at National level and state level are moving in uniform direction. According to the National Statistical Office male literacy 85.70 in the jammu and Kashmir is much higher than female literacy 68 percent. Looking at the rural and urban scenario of literacy, it is seen that rural female literacy (66 percent) is much lower than urban female literacy (75.70 percent) in the state. Therefore, to study the correlation between sex ratio and literacy in rural and urban areas is shown in the table No 4.

**Table NO 4-Karlpearson’s Co-efficient of Correlation Between Literacy and Sex Ratio in Rural and Urban Population**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| S.NO | District | Sex Ratio | Literacy | Overall in 2001 | Overall in 2011 |
| Rural | Urban | Rural | Urban | Sex Ratio | Litercy | Sex Ratio | Literacy |
| 1 | Anantnag | 936 | 842 | 43.70 | 62.60 | 922 | 46.50 | 927 | 62.69 |
| 2 | Pulwama | 952 | 883 | 47.90 | 63.40 | 945 | 49.60 | 912 | 63.48 |
| 3 | Srinagar | 913 | 835 | 38.70 | 65.10 | 851 | 59.80 | 900 | 69,41 |
| 4 | Budgam | 940 | 854 | 40.20 | 60.30 | 930 | 42.50 | 894 | 56.08 |
| 5 | Baramullah | 912 | 839 | 42.30 | 60.30 | 903 | 45.50 | 885 | 64.43 |
| 6 | Kupwara | 916 | 688 | 42.40 | 62.80 | 906 | 43.20 | 835 | 64.51 |
| 7 | Leh | 904 | 611 | 59.90 | 81.80 | 823 | 65.30 | 690 | 77.20 |
| 8 | Kargil | 861 | 559 | 58.80 | 80.80 | 837 | 60.80 | 810 | 71.34 |
| 9 | Jammu | 902 | 828 | 71.70 | 83.50 | 868 | 77.00 | 880 | 83.45 |
| 10 | Udhampur | 897 | 684 | 49.20 | 85.40 | 860 | 55.20 | 870 | 68.49 |
| 11 | Doda | 918 | 727 | 61.70 | 89.40 | 903 | 64.00 | 919 | 64.68 |
| 12 | Kathua | 912 | 835 | 63.10 | 80.01 | 901 | 65.60 | 890 | 73.09 |
| 13 | Rajori | 890 | 736 | 55.80 | 85.40 | 878 | 58.00 | 860 | 68.17 |
| 14 | Poonch | 932 | 745 | 62.50 | 93.50 | 919 | 65.00 | 893 | 66.74 |
| 15 | \*kulgam |  |  |  |  |  |  | 951 | 59.23 |
| 16 | \*Bandipora |  |  |  |  |  |  | 889 | 56.28 |
| 17 | \*Samba |  |  |  |  |  |  | 886 | 81.41 |
| 18 | \*Reasi |  |  |  |  |  |  | 890 | 58.15 |
| 19 | \*Ganderbal |  |  |  |  |  |  | 874 | 58.04 |
| 20 | \*Ramban |  |  |  |  |  |  | 902 | 54.27 |
| 21 | \*Shopiyan |  |  |  |  |  |  | 951 | 60.76 |
| 22 | \*Kishtiwar |  |  |  |  |  |  | 920 | 56.20 |

**Source: DEPS, UT, J &K**

\*These district were created in August 2019, as such no exclusive data is available about them prior to their existence.

**Correlation and Regression Analysis**

It is evidently clear from the above table that the sex ratio is relatively appreciable in rural areas than in urban areas. Nevertheless, the literacy rate is somewhat lower in rural areas when compared with the urban areas. This hints that low literacy contributes to a better sex ratio and literacy to adverse sex ratio. The parametric statistics measure Karlpearson’s coefficient of correlation between female literacy and sex ratio in urban areas appeared negative -0.516 and for rural areas +0.5034, indicating sex ratio and female literacy move in opposite direction. the similar findings have been confirmed by ( Agnihotri , 2000: Corll ,2000 ). Moreover, the official data was further put into simple bivariable regression model analysis to study the extent of interdependence between the two variables. The results of the two analyses are presented in the following table NO: 5

 **Table No 5-Regression and Correlation Analysis of Literacy and Sex Ratio**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Sex-ratio 2001 & 2011 | Co-efficient | Std Error Coefficient | T | P> [ t] | Correlation |
| Literacy 2001 | -1.840443 | 0.8812169 | -2.09 | 0.059 |  0.516 [ 0.363 and 0.5034 for rural and urban areas] |
| Constant  | 999.9052 | 50.9858 | 19.49 | 0.000 |
| Literacy 2011 | -3.037091 | 1.308765 | -2.32 | 0.031 |
| Constant | 1081.468 | 86.12685 | 12.56 | 0.000 |

Moreover, the regression coefficients between literacy and sex ratio are negative with p-values of 0.059 and 0.031, implying literacy contributes to adverse sex ratio. Further to understand the behaviour of the two variables and trends , the data was put to time series analysis.

**Time Series Trend Analysis**

The introspection of data relating to literacy and sex ratio through time series analysis indicate that sex ratio moves with zigzag oscillations and literacy however with a uniform movement, indicating that sex ratio changes are faster than literacy rate change. This explains that sex ratio is significantly regulated by the literacy as can be seen in red and blue lines. The red line indicating sex ratio oscillates rigorously and the blue line referring to the literacy rate moves uniformly thereby depicting their interconnection and interdependence.

**Fig 1-Sex-Literacy Graph: 2001**

**Fig 2-Sex-Literacy Graph: 2011**

**Lack of Uniform Population Policy Agenda**

Population policy is a bible document that regulates all domains of population be it sex ratio, child mortality, morbidity etc. Nevertheless, the state of jammu and Kashmir does not any official policy for population regulation. It is significantly due to this fact, different department of the state work in different directions. The department of Health and Welfare is pushing programmes like family planning, small familiy, necular family concept among the people while population experts are talking about adverse sex ration. The education department is striving for greater literacy especially in backward ares when the same literacy is destabilizing sex ratio in the state. Earlier, the government of Jammu and Kashmir was emphassing upon family planning and had given a popular slogan for population control“ WE TWO AND OUR TWO” and therafter one child policy. This slogan had been misconceived by the people and they adopted or followed it by resorting to selective birth preference in favour of male babies. This has led to adverse sex ratio over the period of time.

**Availability Advanced Medical Care**

The advancement medical science has led low sex ratio at the national and state level. The ultrasound prenatal sex determination is responsible for eliminating majority of female fetus especially for literature pregnant females. However, medical experts question the accuracy of these machines and tests, they opine that no machine or test can exactly determine the sex of a fetus well in advance. Moreover, the documented research has unfolded that the gender of a fetus dermination is always questionable. Khuroo (2011) states that it has been repeatedly stressed in the literature by well done studies that determination of prenatal sex through ultrasound is subject to many variables and can be grossly fallacious. It strongly depends upon the standard, quality of machine, equipment, type of ultrasound probes, age of pregnancy and of course expertise of the operator. Inappropriate fetal position, excess amount of amniotic fluid and increased thickness of the abdominal wall of the mother can grossly adversely affect prenatal sex determination. Many the genital tubercle of female times if prominent can look like a male organ and vice versa. Sometimes umbilical card in a female fetus may resemble male organ and give fallacious results Thus chance of making a correct prenatal sex determination at 11 weeks of pregnancy is around 50 percent subject to availability of high quality ultrasound machine and well experienced sinologist is doing a careful examination. Despite of the fact, sex determination of fetus can never reach 100 percent. Therefore a true sex of a baby can be determined only at birth.

**Socio Economic Bottlenecks**

Undoubtedly, violence against women is still happening day in day out. According to one study, Among all the state of Indian Union, Jammu and Kashmir stands at the top as far as violence against women is concerned She does not have adequate safety equal to men both in and outside the home. She is chased for malicious activity, knotted in marriage for dowry and viewed as an obedient servant for family. We as enlightened society yet have not accepted her a vital part of our system equal to men. These adversities compel women to exercise the choice of selective birth and discourage female fetus. Moreover, there are many other socio-economic factors like high cost of living, social prestige for males, property inheritance policy, decline in soci-cultural values etc that destabilize the sex ratio in the state

**Main Findings**

* The sex ratio is continuously falling in both at the national and state levels in India.
* The literacy rate is continuously growing both at the national and state level in India
* The sex ratio and literacy rate is inversely related, and the former is affected by the latter
* The availability of fetus determination facilities helps the females to avoid the birth of a female child in the region under study
* The choice of females for small families motivates them to prefer male children only.
* The socio-cultural factors are fully against the females in the region
* The females have inadequate earning opportunities in the region.

**Conclusion**

The adverse sex ratio is in the state of Jammu and Kashmir is predominantly an offshoot of growing literacy among the females and sex determination medical centers besides the other socio-economic factors. This trend is sure to continue in the future as well with some marginal variations.

**Suggestions**

In the backdrop of the above discussion, the following suggestions are made:

* The government of state Jammu and Kashmir should draw a comprehensive population agenda or policy which should cover all areas and aspects falling under the domain of gender statistics. The population policy be drawn in view of the available resources and potential to translate such resources for overall quality development human element and overall national and international requirements. The population policy should take care of the existing situation of females and should evolve the mechanism that can push female empowerment.
* The government should frame strict laws to contain violence against women so that her position in the society is elevated. This will enable women to enjoy equal status in the society. This would also motivate women not to abort female child and rather would encourage her to have her next child only female. Such laws should strictly implemented to ensure that male culprits are punished.
* The government should empower women by giving her due recognition and role in all aspects of life. The women should be allowed to work freely and hold prominent positions of public life. They should be given adequate role for social and economic development of the state and nation. This will empower women and as such she would not prefer to have male baby over the female child.
* The government should educate the people in general and women in particular through public media that sex determination of fetus through ultrasound yet not is an exact means to find the true sex of baby. The false propaganda should be widely exposed that medical science determine gender of the fetus. The people at large and specifically women should be educated that using ultrasound is a false and baseless method to find the gender of a fetus. A sex of fetus can not be determined completely and exactly. For this purposes, the government should work hard to bring more and more females in the fold of education so that they improve their own lot and the lot of their family.
* The society should accept girl child as a blessing than a curse. People should reverse their attitude and mindset towards the girls. The society should not lookdown female child as burden and debt ridden liability. The government should plan and devise special schemes for betterment and progressive life and contribution of women.
* The social evils like dowry should be banned by the government. We as a society should learn to perform zero dowry marriages. The government should enact stringent laws to minimize and eliminate dowery menace. The society should become conscious to eliminate all undesirable acts and traditions which bringdown the overall value, prestige and well being of female.

**Limitations of the study**

The main limitation of the study is that it is limited to the state of Jammu and Kashmir and examines the panel data pertaining to the last two decades. Therefore, the study needs to be further undertaken in other states of India to reinforce its findings or otherwise.

**Disclaimer (Artificial Intelligence)**

It is certified that no Artifical Intelligence (AI) technologies such a Large Language Model etc, has been used during the writing or editing of this manuscript to the best of my belief and knowledge.

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