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A study on India's selected demography factors: 2021 projection

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Abstract

This paper is about the projection of India's population for the year 2021 and predicts the states with high population, female fertility ratio, life expectancy of male and female and mortality which will help the society, planning commission, political system, Economic planning etc. to yield a realistic picture of the probable future development of a population.

Keywords: Demography, projection, high population, female fertility ratio, life expectancy mortality ratio

1. Introduction

Demography is the scientific study of human population, primarily with respect to the size their structure and their development Socioeconomic characteristics of a population expressed statistically, such as age, sex, education level, income level, marital status, occupation, religion, birth rate, death rate, average size of a family, average age at marriage. A census is a collection of the demographic factors associated with every member of a population.

Subject matter of Demography is Size and shape of the population, Aspects related to birth rate and death rate, Composition and density of population, Socio-economic problem and Quantitative qualitative aspects.

Demography as a science studies about a systematized body of knowledge, It must have its own laws or theories, they can be tested by observation and experimentation, they can make predictions, they can self-corrective and have universal validity. Demography studies about the following aspects scientifically i.e. about the economy, about society, about Economic planning

2. Population projection

According to a UN study, "population projection is calculations which show the future course of fertility, mortality and migration. They are in general purely formal calculations, developing the implications of the assumptions that are made" in fact, they are only statements about birth rate, death rate and migration of population at some future date, based on certain assumptions. One the other hand a "population forecast is a projection in which the assumptions are considered to yield a realistic picture of the probable future development of a population. Different types of population projections are total projections and regional projections, forward projection and backward projections, high, medium and low projections of population. Projections made for the whole country are called total projections. But when projections are made for a region, state or province, district or ethnic group, they are called regional or sect oral projection s. total projections are easy to make as compared with regional projection. As a matter of fact, all projections are based on based on past data for the future population. They are called forward projection. However, in certain exceptional cases, projections are made about population. These are known as backward projection.

Population projections are made on the basis of certain assumptions relating to birth rate, death rate and migration. If it assumed that the birth rate is high, death rate is low, immigration rate is high and emigration rate is low, there is high projection of population. If it is assumed that there is medium increase in birth rate and death rate and medium increase in immigration rate

and emigration rate, it is known as medium projection of population. Low projection of population is also suitable for developed countries the assumptions that there are low birth and death rates and both immigration and emigration rate are also low.

2.1 Arithmetic method: In the arithmetic projection method, it is assumed that the annual change in population remains the same throughout the projection period and crude birth and rates are taken.

$$P_p = P + \frac{n(P_1 - P_2)}{N}$$

Where,

P_p = Population projection in the future;

P_1 = Present population as per the recent census;

P_2 = Size of population in the previous census;

n = Number of years between the projection year and the previous census;

N = Total number of years between the recent and previous census;

2.2 Geometric method: In the geometric projection method the formula is

$$P_p = P_1 (1+r)^n$$

Where,

P_p = Projected population;

P_1 = Population as per the recent census;

r = Annual rate of increase or decrease of population;

n = Number of years.

3. Objectives of the study

- To know the census projection for the year 2021
- To estimate the Female Fertility rate projection for the year 2021
- To find out the Life Expectancy projection for the year 2021
- To find out the Mortality rate projection for the year 2021

4. Importance of the study

The study of Population Projection is an immense important to an economy, society, planning commission, political system etc. In the present study only selected demographic factors are projected for the Population in 2021.

5. Limitations of the study

The time period was insufficient to conduct in depth study for the projected population

There was less opportunity to get information from the website for the population data

Only few selective models have been applied in this project by considering, the duration and the nature of the project.

6. Sources of demographic data

- Population census
- Registration of vital statistics relating to births, deaths
- Sample surveys

6.1 Population census

The most important sources of demographic data is the census. The word "census" is derived from the Latin word censens which means "to assess". The new international

Webster's dictionary defines it thus: "An official count of the people of country or district including age, sex, employment, etc." A United Nations study defines the population census as the "total process of collecting, compiling and publishing demographic, economic and social data pertaining, at a specified time or times to all persons in a country or delimited territory". Thus a population census is an official enumeration of the inhabitants of country with statistics relating to their location, age, sex, marital status, literacy status, language, educational level, economic activity, number of children, migration, etc. population census is a regular feature of all progressive countries, whatever be their size and political setup. It is conducted at regular intervals, usually every 10 years, for fulfilling well-defined objectives.

6.1.1 Determinants of population growth

The birth rate, death rate and migration are the three important determinants of population growth. In the process of the population growth, even though fertility is a process of physiology, socio-economic conditions of any country can be known from the birth rate information of the country in the same way, death rate too, plays an important role as the determining factor of population growth. As compared to birth and death rates, migration has limited importance as the determinant of population growth. When migrants come with an objective of settling down in a country from some other country, population usually increases, similarly, when people move to other countries for permanent settlement, called migrants, there is likely to be a decrease in population.

6.1.2 Operational Definition

a) Fertility

Fertility is generally used to indicate the actual reproductive performance of the woman or groups of women." Fecundity, on the other hand, has different meaning, "if a female is able to conceive, then she is said to be fecund. In fact, fecundity is the capacity of a man and woman to produce a live child. In ancient times, both the word, 'still birth' and 'live birth' were used. But at present, the word 'birth' is being used only for 'live birth.' The meaning of fertility, in short, is the ability to the female to give birth to a child. Birth rate means the total number of children born per thousand population in a particular area in a specific period.

i) Crude birth rate

The crude birth rate for any specified population is obtained by dividing the number of the births recorded in that population during a specified year by its total number, which gives a fraction of birth per person.

$$\text{Crude birth rate} = \frac{\text{Number of live birth in a given year}}{\text{Mid year population}} \times 1000$$

ii) General fertility rate

The number of children born per year per thousand females in the age group of 15-49 years, is called the general fertility rate.

$$\text{General fertility rate} = \frac{\text{Number of children born during a year}}{\text{Number of female of age group 15-49}} \times 1000$$

iii) Age specific fertility rate

When the number of live births to woman of definite age group per year is divided by the total number of females of that age group only multiplied by 1000 in called age specific fertility rate

$$\text{ASFR} = \frac{\text{No. of live births to women of specific age group}}{\text{Mid-year women population of that age group}} \times 1000$$

iv) Total fertility rate

The total fertility rate is the sum of age specific fertility rate of women in all age specific Group

$$\text{Total fertility rate} = \frac{\text{Sum of age specific fertility rate} \times \text{Magnitude of the age group}}{1000}$$

v) Gross reproduction rate

The gross reproduction rate relates the fertility rate to female birth only. It is defined as the number of girls which are expected to be born to 1000 females passing through their child bearing year. The gross reproduction rate is calculated from the total fertility rate

$$\text{Gross Reproduction} = \frac{\text{NO. of female births}}{\text{Total number of births}} \times \text{total fertility rate}$$

b) Mortality

Mortality means death. Death is defined as "The permanent disappearance of all evidence of life at any time after birth has taken place." thus death does not include abortions and still births. The study of causes and measures to reduce mortality are very important in demography which can be analyzed in terms of the death rates.

i) Crude death rate

The crude death rate is the number of deaths per 1000 people in a year in relation to the total population.

$$\text{CDR} = \frac{\text{Total deaths in a year}}{\text{Total mid-year population}} \times 1000$$

It is a simple method to measure the death rate because it taken only the data of total mid-year population and total deaths. But it has certain defects. First, it combines the death of different age groups. So it fails to give a correct measure of mortality because in less develop countries infant mortality rate, maternal death rates and old people death rate are high. Second, it is also not possible to make inter-regional comparisons in a country due to variations in death rate, third, the sources of data for population and deaths are different. Population data are based on the census and that of deaths on registration authorities. This is unscientific.

ii) Age specific death rate

As the death rates in the case of infants and old people are high and that of young people are low, it is advisable to classify people under different categories according to their age groups, the age specific death rate is calculated as under.

$$\text{Age specific death rate} = \frac{\text{NO. of deaths in a specific age group of population}}{\text{Total mid-year population in that age group}} \times 1000$$

6.2 Registration method

Another source of the population data is the registration of life or vital statistics. Every person is required by law to register with a specified authority such demographic event as birth,

death, marriage, divorce, etc. Registration is secondary source of demographic data which is available from four sources:

- Vital Registration
- Population Registration
- Other Records,
- International publications.

6.2.1 Vital Registration

Recording of vital events (or statistics) like births, deaths, marriage, divorce, etc.

- **Birth certificate**

Name, Father's Name, Mother's Name, Age of Father, Age of Mother and Legitimacy

- **Death certificate**

Name of the decease of death, date of death, sex, race/caste, age of the deceased, place of death, cause of death, occupation, marital status, permanent residence, etc.

6.2.2 Population registers

This is another secondary source of collecting population data. A number of European and Asian countries like Belgium, Sweden, Korea, Israel, etc. The population register, help in verifying the correctness of the census figures for that year.

6.2.3 Other Records

Besides the population register, there are other records which are secondary sources of demographic data in developed countries. They maintain population records to meet social security schemes like unemployment insurance and allowance, old age pension, maternity allowance, etc.

6.2.4 International publications

The United Nations Development Program me (UNDP) in its Human Development Report Publish annually demographic data relating to population growth, projection, fertility, mortality, health, etc.

6.3 Sample surveys

Sample survey is another source of collecting population data. In sample survey, information is collected from a sample of individuals rather than from the entire population. A sample consists of only a fraction of the total population. Several different population samples can be drawn on the basis of sample surveys such as the number of abortions, contraceptives used, etc.

7. Collection and Analysis of Data

The data for the study have been collected from the website Office of the Registrar General of India, Ministry of Home Affairs from the census year 1951 to the census year 2011 and calculated projected population of states, Female Fertility ratio, Life Expectancy of Male & Female and Mortality ratio for the census year 2021.

Table 1: Table showing Projected Population of states for the year 2021

S. No	State	1951	1961	1971	1981	1991	2001	2011	2021
1	Andhra Pradesh	31115	35983	43503	53551	66508	76210	84665	93663
2	Andaman & Nicobar	31	64	115	189	281	356	380	458
3	Arunachal Pradesh	0	337	468	632	865	1098	1382	1549
4	Assam	8029	10837	14625	18041	22414	26656	31169	34374
5	Bihar	29085	34841	42126	52303	64531	82999	103804	107509
6	Chandigarh	24	120	257	452	642	901	1054	1212
7	Chhattisgarh	7457	9154	11637	14010	17615	20834	25540	27119
8	Dadra & Nagar Haveli	42	58	74	104	138	220	342	324
9	Daman and Diu	49	37	63	79	102	158	242	227
10	Delhi	1744	2659	4066	6220	9421	13851	16753	18211
11	Gujarat	16263	20633	26697	34086	41310	50671	60383	65299
12	Goa	547	590	795	1008	1170	1348	1457	1648
13	Haryana	5674	7591	10036	12922	16464	21145	25353	27394
14	Himachal Pradesh	2386	2812	3460	4281	5171	6078	6856	7528
15	Jammu and Kashmir	3254	3561	4617	5987	7837	10144	12548	1374
16	Jharkhand	9697	11608	14227	17612	21844	26946	32966	34714
17	Karnataka	19402	23587	29299	37138	44977	52851	61130	66825
18	Kerala	13549	16904	21347	25454	29099	31841	33387	38389
19	Lakshadweep	21	24	32	40	52	61	64	74
20	Madhya Pradesh	18615	23218	30017	38169	48566	60348	72597	78041
21	Maharashtra	32003	39554	50412	62783	78937	96879	112373	122460
22	Manipur	578	780	1073	1421	1837	2294	2721	2989
23	Meghalaya	606	769	1012	1336	1775	2319	2964	3102
24	Mizoram	196	266	332	494	690	889	1091	1178
25	Nagaland	213	369	516	775	1210	1990	1980	2327
26	Odisha	14646	17549	21945	26370	31660	36805	41947	45864
27	Puducherry	317	369	472	604	808	974	1244	1302
28	Punjab	9161	11135	13551	16789	20282	24359	27704	30255
29	Rajasthan	15971	20156	25766	34262	44006	56507	68621	73454
30	Sikkim	138	162	210	316	406	541	607	677
31	Tamil Nadu	30119	33687	41199	48408	55859	62408	72138	77425
32	Tripura	639	1142	1556	2053	2757	3199	3671	4204
33	Uttar Pradesh	60274	70144	83849	105137	132062	166198	199581	210784
34	UttarKhand	2946	3611	4493	5726	7051	8489	10116	108945
35	West Bengal	26300	34926	44312	54581	68078	80178	91347	101305

Source: Office of the Registrar General of India, Ministry of Home Affairs.

7.1 Inference: From the above table it can be inferred that 2021 and Lakshadweep shows very less in population for the Uttar Pradesh ranks high in population projection for the year year 2021.

Table 2: Table showing Projected Female Fertility ratio of states for the year 2021

S. No	States	2009	2010	2011	2012	2013	2021
1	Andhra Pradesh	18.3	17.9	15.1	17.5	17.4	15.04
2	Andaman & Nicobar	16.3	15.6	15.1	15	14.6	11.32
3	Arunachal Pradesh	21.1	20.5	19.8	19.4	19.3	15.32
4	Assam	23.6	23.2	22.8	22.5	22.4	19.8
5	Bihar	28.5	28.1	27.7	27.7	27.6	25.72
6	Chandigarh	15.9	15.6	15	14.8	14.7	12
7	Chhattisgarh	25.7	25.3	24.9	24.5	24.4	21.56
8	Dadra & Nagar Haveli	27	26.6	26.1	25.6	25.5	22.16
9	Daman and Diu	19.2	18.8	18.4	18.1	17.9	15.18
10	Delhi	18.1	17.8	17.5	17.3	17.2	15.28
11	Gujarat	22.3	21.8	21.3	21.1	20.8	17.76
12	Goa	13.5	13.2	13.3	13.1	13	12.12
13	Haryana	22.7	22.3	21.8	21.6	21.3	18.44
14	Himachal Pradesh	17.2	16.9	16.5	16.2	16	13.46
15	Jammu and Kashmir	18.6	18.3	17.8	17.6	17.5	15.06
16	Jharkhand	25.6	25.3	25	24.7	24.6	22.44
17	Karnataka	19.5	19.2	18.8	18.5	18.3	15.76
18	Kerala	14.7	14.8	15.2	14.9	14.7	14.96
19	Lashed weep	15	14.3	14.7	14.8	14.8	14.82
20	Madhya Pradesh	27.7	27.3	26.9	26.6	26.3	23.46
21	Maharashtra	17.6	17.1	16.7	16.6	16.5	14.2
22	Manipur	14	14.9	14.4	14.6	14.7	15.62
23	Meghalaya	15.4	24.5	24.1	24.1	23.9	39
24	Mizoram	17.6	17.1	16.6	16.3	16.1	12.94

25	Nagaland	17.2	16.8	16.1	15.6	15.4	11.42
26	Odessa	21	20.5	20.1	19.9	19.6	16.82
27	Puducherry	16.5	16.7	16.1	15.8	15.7	13.66
28	Punjab	17	16.6	16.2	15.9	15.7	12.98
29	Rajasthan	27.2	26.7	26.2	25.9	25.6	22.32
30	Sikkim	18.1	17.8	17.6	17.2	17.1	14.96
31	Tamil Nadu	16.3	15.9	15.9	15.7	15.6	14.28
32	Tripura	14.8	14.9	14.3	13.9	13.7	11.12
33	Uttar Pradesh	28.7	28.3	27.8	27.4	27.2	23.98
34	Uttarakhand	19.7	19.3	18.9	18.5	18.2	15.12
35	West Bengal	17.2	16.8	16.3	16.1	16	13.38

Source: Sample Registration System (SRS) Bulletin various issues, Office of the Registrar

7.2 Inference

From the above table it can be inferred that Meghalaya rank

high and Tripura rank less in Female Fertility ratio for the year 2021.

Table 3: Table showing Life Expectancy of Male & Female of selected states for the year 2021

States	2005		2006		2007		2008		2009		2021	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Andhra Pradesh	63.4	67.9	63.5	68.2	64	68.6	64.7	69.4	65.5	70.4	71.8	77.58
Assam	60.5	62.9	61	63.2	61.2	63.6	61.2	64.8	61.9	65.1	65.4	72.32
Bihar	64.9	65.3	65.5	66.2	65.9	66.8	66.7	67.6	67.3	68	74.5	76.3
Gujarat	64.4	68.7	64.9	69	65.2	69.6	65.5	70.1	66	70.5	70.5	76.16
Haryana	65.1	69.2	67	69.5	65	69.8	65.4	70.1	65.8	70.9	65.4	75.5
Himachal Pradesh	67.7	72	67.7	72.4	67.9	72.3	68.3	72.7	69	73.1	72.6	76
Jammu&Kashmir	68.9	71.2	69.2	71.1	69.4	71.9	69.9	72.4	70.6	74	75.3	81.78
Karnataka	64.6	69.2	64.9	69.7	65.2	70	65.8	70.3	66.4	70.8	71.7	75.32
Kerala	71.3	77.2	71.5	76.9	71.5	77.3	71.6	77.7	71.8	77.8	73.1	80.18
Madhya Pradesh	60.8	63.1	61.1	63.8	61.3	64.5	61.9	65	62.3	65.5	66.8	72.78
Maharashtra	67.6	71.9	67.9	71.9	68.3	72.4	68.8	72.9	69.4	73.4	74.7	78.1
Odisha	61.7	63.4	62.2	63.9	62.9	64.5	63.4	65.3	63.8	65.9	70.4	73.56
Punjab	67.2	71.4	67.4	71.6	67.7	72.4	68.1	72.9	69.1	73.4	74.2	79.76
Rajasthan	64.7	67.8	64.7	68.3	65	68.7	65.2	69.4	65.4	70	67.7	76.54
Tamil Nadu	66.9	70.6	67.1	70.9	67.6	71.4	67.9	71.9	68.2	72.3	72.3	77.58
Uttar Pradesh	61.6	63.1	61.8	63.7	61.9	64.2	62.3	64.8	62.5	65.2	65.2	71.62
West Bengal	66.9	70.6	67.8	71	67.8	71.3	68.1	71.5	68.5	71.6	72.7	74.7

Source: Sample Registration System (SRS), abridged life table, Office of the Registrar General & Census Commissioner

7.3 Inference

From the above table it can be inferred that Jammu and Kashmir ranks high in Life Expectancy of Male& Female population

of selected states for the year 2021. Uttar Pradesh shows less in Life Expectancy of Male& Female population of selected states for the year 2021.

Table 4: Table showing Projected Mortality ratio of states for the year 2021

S. NO	States	2009	2010	2011	2012	2013	2021
1	Andhra Pradesh	7.6	7.6	7.5	7.4	7.3	6.68
2	Andaman and Nicobar	4.1	4.3	4.6	4.6	4.6	5.74
3	Arunachal Pradesh	6.1	5.9	5.8	5.8	5.8	5.18
4	Assam	8.4	8.2	8	7.9	7.8	6.56
5	Bihar	7	6.8	6.7	6.6	6.6	5.74
6	Chandigarh	3.9	3.9	4.1	4	4	4.28
7	Chhattisgarh	8.1	8	7.9	7.9	7.9	7.46
8	Dadra and Nagar Haveli	4.8	4.7	4.6	4.5	4.4	3.6
9	Daman and Diu	5.1	4.9	4.9	4.8	4.9	4.42
10	Delhi	4.4	4.2	4.3	4.2	14.1	25.64
11	Gujarat	6.9	6.7	6.7	6.6	6.5	5.78
12	Goa	6.7	6.6	6.7	6.6	6.6	6.44
13	Haryana	6.6	6.6	6.5	6.4	6.3	5.78
14	Himachal Pradesh	7.2	6.9	6.7	6.7	6.7	6.44
15	Jammu and Kashmir	5.7	5.7	5.5	5.4	5.3	5.68
16	Jharkhand	7	7	6.9	6.8	6.8	5.64
17	Karnataka	7.2	7.1	7.1	7.1	7	4.42
18	Kerala	6.8	7	7	6.9	6.9	6.3
19	Lashed weep	5.8	6.4	6.4	6.4	6.3	6.7
20	Madhya Pradesh	8.5	8.3	8.2	8.1	8	7.02
21	Maharashtra	6.7	6.5	6.3	6.3	6.2	5.2
22	Manipur	4.7	4.2	4.1	4	4	2.6
23	Meghalaya	8.1	7.9	7.8	7.6	7.6	6.5
24	Mizoram	4.5	4.5	4.4	4.4	4.3	3.92

25	Nagaland	3.6	3.6	3.3	3.2	3.1	1.96
26	Odisha	8.8	8.6	8.5	8.5	8.4	7.66
27	Puducherry	7	7.4	7.2	7.1	7	6.84
28	Punjab	7	7	6.8	6.8	6.7	6.06
29	Rajasthan	6.6	6.7	6.7	6.6	6.5	6.32
30	Sikkim	5.7	5.6	5.6	5.4	5.2	4.3
31	Tamil Nadu	7.6	7.6	7.4	7.4	7.3	6.66
32	Tripura	5.1	5	5	4.8	4.7	3.92
33	Uttar Pradesh	8.2	8.1	7.9	7.7	7.7	6.52
34	Uttarakhand	6.5	6.3	6.2	6.1	6.1	5.24
35	West Bengal	6.2	6	6.2	6.3	6.4	6.92

Source: Sample Registration System (SRS) Bulletin various issues, Office of the Registrar general Census Commissioner.

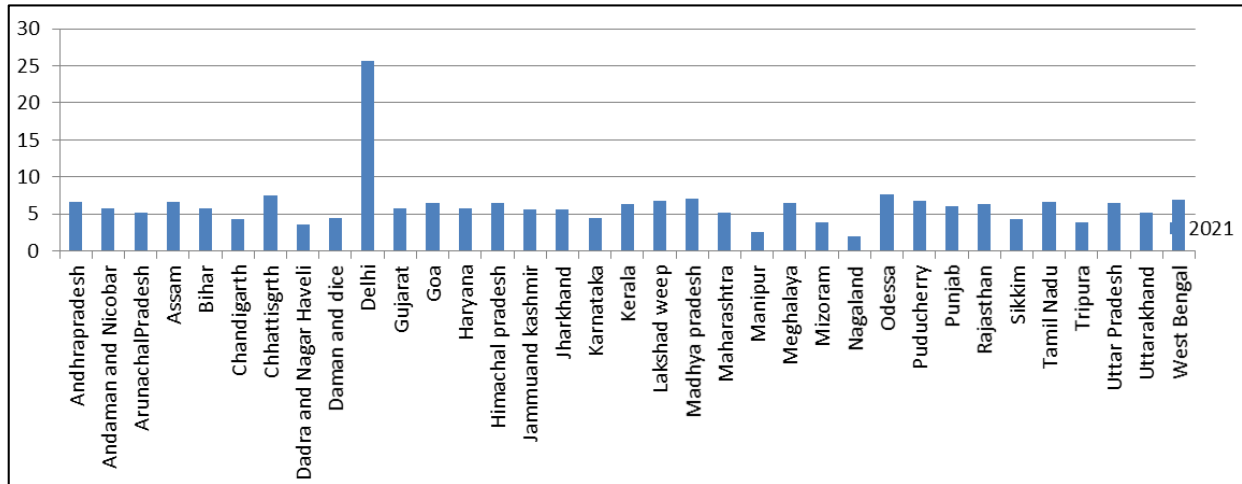


Fig 1: Diagram showing Projected Mortality ratio of states for the year 2021

7.4 Inference

From the above diagram it can inferred that Delhi ranks high in Mortality for the year 2021. Nagaland shows less in Mortality for the year 2021

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8. Conclusion

- Uttar Pradesh ranks high in population for the year 2021 and Lakshadweep shows very less in population for the year 2021.
- Meghalaya rank high and Tripura rank less in Female Fertility ratio for the year 2021
- Jammu and Kashmir ranks high, in Life Expectancy of Male and Female population of selected states for the year 2021.
- Delhi ranks high in Mortality for the year 2021. Nagaland shows less in Mortality for the year 2021

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