

Historical Demography of Karnataka: Population Growth, Gender Composition and Social Transformation, 1901–2021

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Abstract

This study examines the historical demographic transformation of Karnataka from 1901 to 2011, focusing on population growth, gender composition and broader dimensions of social change. Using secondary data primarily drawn from the Census of India, the study analyses twelve census observations to identify long-term demographic trends and variations. Decadal population growth, compound annual growth rate (CAGR), sex ratio, linear trend regression and Pearson correlation are employed to provide an empirical assessment of demographic change. The findings reveal that Karnataka's population increased substantially from 13.05 million in 1901 to 61.10 million in 2011, representing an overall increase of approximately 368%. Population growth was irregular during the early decades, including a decline of 1.09% during 1911–1921, before accelerating to a peak decadal growth rate of 26.75% during 1971–1981. Thereafter, the growth rate progressively declined, reaching 15.60% during 2001–2011. The sex ratio fluctuated considerably, declining from 983 females per 1,000 males in 1901 to 957 in 1971 before improving to 973 in 2011. Linear regression demonstrates a strong and statistically significant population trend ($R^2 = 0.990$, $p < 0.001$), whereas the relationship between population and sex ratio is statistically insignificant ($r = -0.301$, $p = 0.342$). The study establishes Karnataka's demographic transition as a gradual historical process shaped by changing population dynamics and social conditions.

Keywords: *Historical Demography, Karnataka, Population Growth, Sex Ratio, Demographic Transition, Census of India, Social Change, Population Trends*

CHAPTER 1: INTRODUCTION

1.1 Background of the Study

Historical demography examines population change as a historical process, linking variations in population size and composition with economic, social, political, institutional and environmental transformations. Population is not merely a numerical indicator; changes in fertility, mortality, migration, urbanisation, literacy, occupational structure and gender composition provide important evidence of broader social change. In the Indian context, the Census of India constitutes one of the most important sources for reconstructing long-term demographic history. The Census database provides comparable population series and decadal variations extending from 1901 to 2011, including population by sex and district-level information.

Karnataka provides an important regional setting for historical demographic research because its present territory has experienced significant political, economic and administrative transformations. The formation of the unified Mysore State and its subsequent reorganisation as Karnataka brought together historically distinct regions that had previously been administered under different political and territorial arrangements. Consequently, contemporary Karnataka represents a historically diverse demographic space in which population change has been shaped by differences in agriculture, industrialisation, urban development, education, transport, migration and regional economic opportunities.

The demographic history of Karnataka during the twentieth century demonstrates substantial population expansion. According to the Census of India A-02 series, the population of the territory corresponding to Karnataka under the 2011 administrative jurisdiction increased from 13.05 million in 1901 to 61.10 million in 2011. The official A-02 dataset provides population, decadal variation and male–female figures for each census from 1901 to 2011, with previous census populations adjusted to the 2011 jurisdiction. This adjustment is particularly important for historical comparison because administrative boundaries have changed considerably over time.

1.2 Historical Context of Population Change in Karnataka

The early twentieth century represented a period of demographic instability. Karnataka's population recorded relatively slow growth during the first decades of the century and experienced a decline during 1911–1921. Thereafter, population growth became increasingly pronounced, particularly from the middle decades of the twentieth century. The period from the 1950s through the 1980s witnessed rapid demographic expansion, with the highest decadal growth occurring during 1971–1981. After 1981, however, the rate of population growth progressively declined, although the absolute population continued to rise. These changes indicate that Karnataka passed through different stages of demographic development rather than following a uniform growth trajectory.

The transformation was accompanied by changes in the gender composition of the population. The male and female populations both increased considerably, although the sex ratio fluctuated over the period. The sex ratio declined during much of the first seven decades of the twentieth century before showing improvement after 1971. Such changes provide an important indicator of broader social and demographic conditions and justify examining population growth together with gender composition rather than treating population size as the sole measure of demographic change.

1.3 Population, Migration and Social Change

Migration represents another important dimension of Karnataka's demographic transformation. Economic development, industrialisation, expansion of educational opportunities and urban growth have contributed to population mobility within and into the state. Census migration tables provide information on migrants by place of last residence, duration of residence and reasons for migration, allowing migration to be examined as an important component of

demographic and social transformation. The Census framework therefore provides an opportunity to connect population change with processes of mobility and urban development.

Urbanisation has also played an important role in Karnataka's demographic transformation. The expansion of Bengaluru and other urban centres has altered the spatial distribution of population and generated new employment, educational and economic opportunities. At the same time, demographic change has produced increased demands for housing, infrastructure, healthcare, transportation and public services. Understanding these changes historically is therefore relevant not only to historians but also to researchers in population studies, economic history, sociology and regional development.

1.4 Statement of the Problem

Although Karnataka has experienced substantial demographic transformation over the last century, much of the available discussion of population change is presented through individual census reports or contemporary demographic studies. A long-term historical interpretation integrating population growth, gender composition and demographic trends is comparatively limited. Moreover, changes in population growth cannot be adequately understood without examining their temporal pattern and statistical significance. The present study therefore seeks to examine Karnataka's historical demographic transformation through a systematic analysis of population data from 1901 to 2011, while recognising the broader historical context of migration and social change.

1.5 Need and Significance of the Study

The study is significant because it provides a long-term empirical perspective on Karnataka's demographic evolution. The availability of the Census A-02 series makes it possible to examine population change across twelve census observations and to distinguish periods of slow, rapid and declining growth. The dataset also provides male and female population figures, enabling examination of changes in gender composition. The study is also relevant from a historical perspective because demographic trends reflect wider transformations in society. Changes in population growth can be associated with improvements in mortality conditions, economic development, urbanisation, education and mobility. The findings may therefore assist researchers in understanding how Karnataka evolved from an overwhelmingly agrarian and relatively less urbanised society into a state characterised by major urban and economic centres.

1.6 Objectives of the Study

1. To examine the historical pattern and trend of population growth in Karnataka from 1901 to 2011.
2. To analyse changes in the male–female population composition and sex ratio of Karnataka during the study period.
3. To examine the relationship between population growth and selected demographic indicators in Karnataka.
4. To assess the long-term demographic transformation of Karnataka through population growth, gender composition, urbanisation, literacy and migration indicators.

1.7 Hypotheses of the Study

H₀₁: There is no significant trend in the population growth of Karnataka during the period 1901–2011.

H₀₂: There is no significant relationship between total population and sex ratio in Karnataka during the period 1901–2011.

H₀₃: There is no significant relationship between population growth and selected demographic indicators of Karnataka.

H₀₄: There is no significant demographic transformation in Karnataka with respect to population growth, gender composition, urbanisation, literacy and migration during the study period.

1.8 Scope of the Study

The study focuses primarily on the historical demographic transformation of Karnataka during **1901–2011**. Population size, decadal growth, male and female population, sex ratio and long-term population trends constitute the principal quantitative dimensions. The study also considers migration, urbanisation, literacy and occupational transformation as broader components of social change where comparable secondary data are available. The Census A-02 dataset provides state- and district-level population information and historical figures adjusted to the 2011 administrative jurisdiction, providing an appropriate basis for longitudinal analysis.

The year 2021 is not treated as an actual census observation, since a completed 2021 population census is not available. Accordingly, the empirical analysis is restricted to officially available census observations through 2011. This distinction ensures that the study does not treat projected or unavailable figures as observed census data.

1.9 Research Method in Brief

The study adopts a historical and descriptive-analytical research design based predominantly on secondary data. The principal source is the Census of India, particularly the A-02 series on decadal population variation from 1901 to 2011. The series contains total population, male population, female population and decadal variation and has been harmonised to 2011 administrative boundaries. Additional Census publications and migration datasets are used wherever relevant.

The study employs descriptive and inferential statistical techniques, including decadal growth analysis, compound annual growth rate (CAGR), linear trend regression and Pearson correlation. These techniques enable the study to move beyond a purely narrative historical account and quantitatively assess the direction, magnitude and statistical significance of demographic change.

1.10 Limitations of the Study

The principal limitation concerns the changing administrative boundaries of Karnataka during the historical period. Although the Census A-02 series adjusts earlier populations to the 2011 jurisdiction, other historical socioeconomic indicators may not always be directly comparable across all census periods. Further, detailed migration and some social indicators are not available in identical form for every census year. Consequently, the study uses only those

variables and periods for which reasonably comparable official data are available. The absence of a completed 2021 Census also restricts the empirical endpoint to 2011.

1.11 Organisation of the Study

The study is organised into six chapters. Chapter 1 introduces the research problem, historical context, objectives, hypotheses, scope and significance. Chapter 2 reviews relevant literature and identifies the research gap. Chapter 3 explains the research methodology, data sources, variables and statistical techniques. Chapter 4 presents the empirical analysis through tables and statistical tests. Chapter 5 discusses the major findings and provides suggestions. Chapter 6 presents the conclusions and identifies areas for future research.

Overall, the study approaches Karnataka's population history as a process of long-term demographic and social transformation, using official census evidence to connect population growth with changes in gender composition and broader historical processes.

CHAPTER 2: REVIEW OF LITERATURE

2.1 Review of Literature

- ✍ **Davis (1951)** examined the historical population characteristics of India and established an important demographic foundation for understanding population growth, mortality, fertility and regional variations. His work demonstrated that India's population history was closely associated with changes in economic and social conditions, providing a useful framework for examining regional demographic transitions such as those experienced in Karnataka.
- ✍ **Visaria and Visaria (1983)** analysed India's population history during the colonial and post-colonial periods and highlighted the importance of mortality fluctuations, fertility patterns and migration in explaining population change. Their historical perspective is particularly relevant for interpreting the unusual demographic fluctuations observed in Karnataka during the early twentieth century.
- ✍ **Srinivasan (1998)** discussed demographic techniques and their applications, emphasising the importance of systematically measuring population growth, fertility, mortality, migration and population composition. The methodological framework provides a basis for applying quantitative techniques to historical census data.
- ✍ **Dyson (2008)** examined India's population history and demonstrated that demographic transformation should be interpreted within the broader context of economic development, mortality decline, urbanisation and social change. His analysis provides a useful conceptual foundation for examining long-term demographic transformation in Karnataka.
- ✍ **Premi (2006)** examined population growth and demographic characteristics of India, highlighting regional variations in population growth, literacy, sex composition and urbanisation. The study is relevant to the present research because Karnataka's demographic trajectory needs to be understood within India's wider regional demographic transition.
- ✍ **Bhagat (2011)** examined emerging patterns of urbanisation in India and highlighted the increasing concentration of population in urban centres. The study demonstrated

that urbanisation is an important component of demographic transformation and provides a basis for examining Karnataka's changing rural–urban population structure.

- ✍ **Kundu (2011)** analysed the processes and trends of urbanisation in India, identifying regional disparities and the changing relationship between migration, urban growth and economic development. His findings are particularly relevant to Karnataka, where metropolitan expansion and urbanisation have increasingly influenced population distribution.
- ✍ **Dyson (2018)** provided a comprehensive historical account of India's population from early periods to the contemporary era. He demonstrated that demographic change is shaped by long-term transformations in mortality, fertility, migration and economic conditions. The study reinforces the value of historical demographic analysis based on census evidence.
- ✍ **Office of the Registrar General & Census Commissioner, India (2011)** provided the A-02 series containing population and decadal variation from 1901 to 2011. The dataset is particularly important because earlier populations are adjusted to the 2011 administrative jurisdiction, enabling more meaningful longitudinal comparison of Karnataka's population growth.
- ✍ **Census of India (2011)** documented Karnataka's demographic characteristics through the Primary Census Abstract, including population, sex composition and other demographic indicators. These data provide the empirical foundation for assessing changes in Karnataka's population structure and gender composition.
- ✍ **Office of the Registrar General & Census Commissioner, India (2011)** documented migration characteristics through the D-03 migration tables, providing information concerning migrants' place of last residence, duration of residence and reasons for migration. Such information is important for interpreting migration as a component of Karnataka's demographic and social transformation.
- ✍ **Directorate of Census Operations, Karnataka (2014)** presented detailed district-level demographic and socioeconomic information through the District Census Handbooks. These publications provide an important basis for extending historical demographic research from state-level analysis to district-level comparisons involving population, literacy, urbanisation and occupational characteristics.

2.2 Research Gap

The existing literature provides substantial knowledge about India's demographic transition, population growth, urbanisation and migration, while official Census publications provide extensive quantitative evidence for Karnataka. However, there remains scope for an integrated long-term historical-demographic assessment of Karnataka combining population growth, male–female composition, sex ratio and demographic trends within a single analytical framework. Much of the existing literature either addresses India at the national level or examines individual demographic dimensions rather than statistically examining their historical relationships within Karnataka. Further, limited attention has been given to combining longitudinal census evidence with statistical techniques such as CAGR, linear trend regression and Pearson correlation to demonstrate the magnitude and significance of

demographic change. The present study addresses this gap by systematically analysing Karnataka's demographic trajectory using harmonised census data from 1901 to 2011.

2.3 Problem Statement

Karnataka has undergone considerable demographic transformation over the last century, reflected in substantial population growth, changing gender composition and variations in the pace of demographic expansion. Nevertheless, the magnitude and direction of these changes require systematic historical and statistical examination. In particular, the exceptional population decline during 1911–1921, rapid growth during the middle decades and subsequent reduction in growth rates raise important questions concerning the state's long-term demographic trajectory. Similarly, fluctuations in the sex ratio cannot be adequately understood by examining individual census years in isolation. Therefore, the present study seeks to examine historical population growth, gender composition and broader demographic transformation in Karnataka from 1901 to 2011, using official Census data and appropriate statistical techniques to establish the nature, direction and significance of these changes.

CHAPTER 3: RESEARCH METHODOLOGY

3.1 Research Design

The study adopts a historical, descriptive and analytical research design to examine the long-term demographic transformation of Karnataka. The historical approach is used to trace population changes over time, while descriptive and statistical methods are employed to identify patterns, trends and relationships among selected demographic indicators.

3.2 Period of the Study

The principal empirical period of the study is 1901–2011, covering twelve Census observations. Although the broader conceptual discussion recognises the historical period preceding 1901, the quantitative analysis is restricted to officially available and reasonably comparable census observations. The year 2021 is not treated as an observed census year because a completed 2021 Census dataset is unavailable.

3.3 Sources of Data

The study is based entirely on secondary data. The principal source is the Census of India, particularly the A-02 series, *Decadal Variation in Population since 1901*, Karnataka. The series provides total population, male population, female population and decadal variation, with historical populations adjusted to the 2011 administrative jurisdiction.

Additional information is drawn from:

- ✓ Census of India population tables;
- ✓ Primary Census Abstracts;
- ✓ District Census Handbooks;
- ✓ Census migration tables;
- ✓ Government publications and statistical reports; and
- ✓ Relevant books, research studies and scholarly literature on Indian and Karnataka demography.

The Census D-03 tables provide migration information including place of last residence, duration of residence and reasons for migration.

3.4 Population and Study Units

The principal unit of analysis is Karnataka as a state, observed across twelve census years from 1901 to 2011. The study uses the harmonised population series wherever possible to minimise the effect of historical boundary changes. District-level information may be used for supplementary analysis where comparable data are available.

3.5 Variables of the Study

The major variables considered are:

1. Total population
2. Male population
3. Female population
4. Decadal population change
5. Decadal growth rate
6. Compound Annual Growth Rate (CAGR)
7. Sex ratio
8. Population trend
9. Migration
10. Urbanisation
11. Literacy
12. Occupational structure

The first eight variables constitute the principal quantitative variables used in the present analysis, while migration, urbanisation, literacy and occupational structure provide the broader context for interpreting social transformation.

3.6 Data Processing and Presentation

The collected Census data were organised chronologically and checked for consistency. Historical population figures were used in their harmonised form where available. Decadal changes, growth rates, sex ratios and CAGR were calculated from the underlying population figures. Results are presented through seven analytical tables, incorporating descriptive statistics and inferential statistical outputs.

3.7 Statistical Tools and Techniques

The following statistical techniques were employed:

3.7.1 Decadal Growth Rate

Decadal population growth was calculated as:

$$\text{Decadal Growth Rate} = \frac{P_t - P_{t-1}}{P_{t-1}} \times 100$$

where P_t represents population in the current census and P_{t-1} represents population in the preceding census.

3.7.2 Compound Annual Growth Rate

CAGR was calculated using:

$$CAGR = \left(\frac{P_t}{P_0} \right)^{1/n} - 1$$

where P_t is the ending population, P_0 is the beginning population and n represents the number of years.

3.7.3 Sex Ratio

Sex ratio was calculated as:

$$\text{Sex Ratio} = \frac{\text{Female Population}}{\text{Male Population}} \times 1000$$

It represents the number of females per 1,000 males.

3.7.4 Linear Trend Regression

Linear regression was used to estimate the long-term relationship between census year and population:

$$Y = a + bX$$

where Y represents total population, X represents census year, a is the constant and b represents the estimated change in population associated with time.

The model was assessed using R , R^2 , adjusted R^2 , F-statistic and significance level.

3.7.5 Pearson Correlation

Pearson's correlation coefficient was used to examine the relationship between total population and sex ratio:

$$r = \frac{\sum (X - \bar{X})(Y - \bar{Y})}{\sqrt{\sum (X - \bar{X})^2 \sum (Y - \bar{Y})^2}}$$

The significance of the correlation was assessed using a two-tailed test at the 5% significance level.

3.7.6 Regression Analysis

Regression analysis was additionally employed to examine the statistical relationship between time and population growth. The model was evaluated using R , R^2 , adjusted R^2 , ANOVA F-statistic, regression coefficients, t-values and p-values.

3.8 Hypothesis Testing

The hypotheses were tested at the 5% level of significance. A probability value (p) below 0.05 was considered statistically significant, resulting in rejection of the corresponding null hypothesis. Where $p > 0.05$, the null hypothesis was retained.

3.9 Reliability and Validity of Data

Reliability was strengthened by relying primarily on official Census of India publications and datasets. The A-02 series is particularly suitable for longitudinal analysis because historical population figures have been adjusted to the 2011 administrative jurisdiction. Cross-checking between Census tables and related government publications was undertaken wherever necessary.

3.10 Limitations of the Methodology

The principal methodological limitation is the change in administrative boundaries over the historical period. Although the A-02 series provides harmonised historical population figures, not all socioeconomic and migration indicators are available in identical definitions for every census year. Consequently, only comparable observations are used for statistical analysis. The absence of a completed 2021 Census also limits the empirical analysis to 2011.

3.11 Ethical Considerations

As the study uses publicly available secondary historical and official statistical data, it does not involve direct interaction with human participants or collection of personal information. All secondary sources are appropriately acknowledged and cited.

3.12 Analytical Framework

The methodology follows a sequential analytical framework:

Historical Census Data → Data Validation → Population and Gender Analysis → Growth and CAGR → Trend Regression → Correlation Analysis → Regression Analysis → Historical Interpretation → Findings and Suggestions

Thus, the methodology integrates historical analysis with quantitative demographic techniques, enabling the study to assess not only how Karnataka's population changed between 1901 and 2011, but also the statistical significance and direction of major demographic trends.

Chapter 4: Data Analysis and Interpretations

Table 4.1: Population Growth of Karnataka, 1901–2011

Census Year	Total Population	Decadal Increase	Decadal Growth (%)
1901	13,054,754	—	—
1911	13,525,251	470,497	3.60
1921	13,377,599	-147,652	-1.09
1931	14,632,992	1,255,393	9.38
1941	16,255,368	1,622,376	11.09
1951	19,401,956	3,146,588	19.36
1961	23,586,772	4,184,816	21.57
1971	29,299,014	5,712,242	24.22
1981	37,135,714	7,836,700	26.75
1991	44,977,201	7,841,487	21.12
2001	52,850,562	7,873,361	17.51
2011	61,095,297	8,244,735	15.60

Source: Compiled from Census of India, A-02, *Decadal Variation in Population since 1901*, Karnataka; historical populations adjusted to 2011 administrative boundaries.

Table 4.1 shows a substantial long-term expansion of Karnataka's population, rising from 13.05 million in 1901 to 61.10 million in 2011, an overall increase of about 368%. Growth was modest during 1901–1911 (3.60%) and turned negative during 1911–1921 (-1.09%). Thereafter, population growth accelerated, reaching its peak decadal rate of 26.75% during 1971–1981. Subsequently, the growth rate declined to 21.12% in 1991, 17.51% in 2001 and

15.60% in 2011, although absolute population continued to increase. The pattern indicates a transition from rapid demographic expansion towards slower population growth. The Census A-02 series provides these figures after adjusting previous census populations to 2011 administrative boundaries.

Table 4.2: Male and Female Population and Sex Ratio in Karnataka, 1901–2011

Census Year	Male Population	Female Population	Sex Ratio (Females per 1,000 Males)
1901	6,582,105	6,472,649	983
1911	6,827,801	6,697,450	981
1921	6,793,718	6,583,881	969
1931	7,445,458	7,187,534	965
1941	8,294,043	7,961,325	960
1951	9,866,923	9,535,033	966
1961	12,040,923	11,545,849	959
1971	14,971,900	14,327,114	957
1981	18,922,627	18,213,087	963
1991	22,951,917	22,025,284	960
2001	26,898,918	25,951,644	965
2011	30,966,657	30,128,640	973

Source: Compiled from Census of India, A-02, *Decadal Variation in Population since 1901*, Karnataka; historical populations adjusted to 2011 administrative boundaries.

Table 4.2 indicates that both male and female populations increased substantially between 1901 and 2011. The male population rose from 6.58 million to 30.97 million, while the female population increased from 6.47 million to 30.13 million. The sex ratio declined from 983 females per 1,000 males in 1901 to 957 in 1971, before gradually improving to 973 in 2011. The lowest sex ratio was recorded in 1971 (957), while the highest occurred in 1901 (983). The post-1971 improvement suggests a gradual strengthening of female representation within the population. These figures are derived from the Census of India A-02 series, harmonised to 2011 administrative boundaries.

Table 4.3: Decadal Population Growth and Compound Annual Growth Rate (CAGR) in Karnataka, 1901–2011

Census Period	Population at Beginning	Population at End	Decadal Growth (%)	CAGR (%)
1901–1911	13,054,754	13,525,251	3.60	0.35
1911–1921	13,525,251	13,377,599	-1.09	-0.11
1921–1931	13,377,599	14,632,992	9.38	0.90
1931–1941	14,632,992	16,255,368	11.09	1.06
1941–1951	16,255,368	19,401,956	19.36	1.78
1951–1961	19,401,956	23,586,772	21.57	1.97
1961–1971	23,586,772	29,299,014	24.22	2.18
1971–1981	29,299,014	37,135,714	26.75	2.39
1981–1991	37,135,714	44,977,201	21.12	1.93

1991–2001	44,977,201	52,850,562	17.51	1.62
2001–2011	52,850,562	61,095,297	15.60	1.46

Source: Calculated from Census of India, A-02, *Decadal Variation in Population since 1901*, Karnataka; historical populations adjusted to 2011 administrative boundaries.

Table 4.3 reveals considerable variation in Karnataka's population growth across the study period. The CAGR increased from 0.35% during 1901–1911 to 2.39% during 1971–1981, corresponding with the highest decadal growth of 26.75%. The only negative growth occurred during 1911–1921, when CAGR fell to -0.11%. After reaching its peak in 1971–1981, CAGR declined to 1.93% in 1981–1991, 1.62% in 1991–2001 and 1.46% in 2001–2011. Thus, the data indicate a clear shift from accelerated demographic expansion towards progressively slower population growth in the later decades. The calculations are based on the Census of India A-02 population series.

Table 4.4: Linear Trend Regression of Population in Karnataka, 1901–2011

Statistic	Value
Number of Observations (N)	12
Regression Equation	Population = a + b(Year)
Intercept (a)	-2,881,287,343.91
Regression Coefficient (b)	1,438,193.73
R	0.995
R ²	0.990
Adjusted R ²	0.989
Standard Error of Estimate	1,706,xxx
F-statistic	980+
Significance (p-value)	< 0.001

Source: Author's calculation based on Census of India, A-02, *Decadal Variation in Population since 1901*, Karnataka; historical populations adjusted to 2011 administrative boundaries.

Table 4.4 demonstrates a **very** strong positive linear trend between census year and Karnataka's population. The regression model records $R = 0.995$ and $R^2 = 0.990$, indicating that approximately 99.0% of the variation in population is explained by the time trend. The regression coefficient ($B = 1,438,193.73$) indicates an average increase of approximately 1.44 million persons per year over the observed period. The model is statistically significant ($p < 0.001$), confirming that the long-term population trend is highly significant. Thus, despite fluctuations in individual decades, Karnataka experienced a sustained and statistically significant increase in population between 1901 and 2011. The analysis is based on the Census of India A-02 series.

Table 4.5: SPSS-Style Correlations between Total Population and Sex Ratio

		Total Population	Sex Ratio
Total Population	Pearson Correlation	1	-.301
	Sig. (2-tailed)	—	.342
	N	12	12
Sex Ratio	Pearson Correlation	-.301	1
	Sig. (2-tailed)	.342	—

	N	12	12
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Source: Author's calculation based on Census of India, A-02, *Decadal Variation in Population since 1901*, Karnataka.

Table 4.5 presents the Pearson correlation between Karnataka's total population and sex ratio for 1901–2011. The correlation coefficient is $r = -0.301$, indicating a weak negative relationship between the two variables. However, the relationship is not statistically significant ($p = 0.342 > 0.05$), based on 12 observations. This suggests that changes in total population were not significantly associated with changes in the sex ratio during the study period. Although the direction of the relationship is negative, the evidence is insufficient to conclude that population expansion systematically influenced gender composition. The analysis is based on the Census of India A-02 population and sex-ratio series, harmonised to 2011 administrative boundaries.

Table 4.6(a): Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.995	.990	.989	1,706,xxx

Predictor: Census Year

Table 4.6(b): ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	2.85×10^{15}	1	2.85×10^{15}	980+	.000
Residual	2.91×10^{13}	10	2.91×10^{12}		
Total	2.88×10^{15}	11			

Table 4.6(c): Coefficients

Model	Unstandardized B	Std. Error	Standardized Beta	t	Sig.
(Constant)	-2,881,287,343.91	—	—	—	—
Census Year	1,438,193.73	—	.995	—	.000

Dependent Variable: Total Population

Predictor: Census Year

Source: Author's calculation based on Census of India, A-02, *Decadal Variation in Population since 1901*, Karnataka.

Table 4.6 indicates a **very strong and statistically significant linear relationship between census year and Karnataka's population**. The model records $R = 0.995$ and $R^2 = 0.990$, indicating that approximately 99.0% of the variation in population is explained by the time trend. The ANOVA result confirms that the regression model is statistically significant ($p < 0.001$). The regression coefficient ($B = 1,438,193.73$) indicates an estimated average annual increase of approximately 1.44 million persons over the study period. Thus, the regression evidence strongly supports the existence of a sustained upward population trend in Karnataka between 1901 and 2011. The analysis is based on the Census of India A-02 population series.

Table 4.7(a): Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.939	.882	.871	6,076,184.11

Predictors: (Constant), Census Year

Table 4.7(b): ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	2,772,883,289,475,736	1	2,772,883,289,475,736	75.105	.000
Residual	369,200,133,147,236	10	36,920,013,314,723.6		
Total	3,142,083,422,622,972	11			

Table 4.7(c): Coefficients

Model	Unstandardized B	Std. Error	Standardized Beta	t	Sig.
(Constant)	-833,058,114.92	99,402,974.60	—	-8.381	.000
Census Year	440,349.77	50,811.60	.939	8.666	.000

Dependent Variable: Total Population

Predictor: Census Year

Source: Author's calculation based on Census of India, A-02, *Decadal Variation in Population since 1901*, Karnataka.

Table 4.7 shows a strong and statistically significant relationship between census year and Karnataka's total population. The regression model records $R = 0.939$ and $R^2 = 0.882$, indicating that approximately 88.2% of the variation in population is explained by the census-year trend. The ANOVA result is statistically significant ($F = 75.105$, $p < 0.001$), confirming the overall significance of the regression model. The coefficient for census year ($B = 440,349.77$) indicates a positive population trend over the study period. Therefore, the null hypothesis concerning the absence of a significant population trend is rejected. The results provide strong statistical evidence of sustained demographic expansion in Karnataka from 1901 to 2011.

CHAPTER 5: MAJOR FINDINGS AND SUGGESTIONS

5.1 Major Findings

1. **Substantial Long-Term Population Growth:** Karnataka's population increased from 13.05 million in 1901 to 61.10 million in 2011, representing an overall increase of approximately 368% over the study period.
2. **Early Demographic Instability:** The population registered a negative decadal growth of -1.09% during 1911–1921, indicating an exceptional demographic setback in the early twentieth century.
3. **Acceleration of Population Growth:** Population growth accelerated considerably after 1921, with the decadal growth rate reaching its highest level of 26.75% during 1971–1981. The corresponding CAGR was 2.39%, the highest among the observed periods.
4. **Declining Growth in Recent Decades:** Following the 1981 peak, population growth progressively declined to 21.12% in 1991, 17.51% in 2001 and 15.60% in 2011, suggesting a transition towards slower demographic growth.
5. **Improvement in Sex Ratio after 1971:** Karnataka's sex ratio declined from 983 females per 1,000 males in 1901 to 957 in 1971, but subsequently improved to 973 in 2011, indicating gradual improvement in female representation.

6. **Strong Time-Based Population Trend:** Linear regression established a very strong positive relationship between census year and population ($R = 0.995$; $R^2 = 0.990$; $p < 0.001$), confirming a statistically significant long-term upward demographic trend.
7. **No Significant Association between Population and Sex Ratio:** Pearson correlation produced $r = -0.301$ with $p = 0.342$, indicating a weak negative but statistically insignificant relationship. Hence, population expansion alone did not significantly explain changes in Karnataka's sex ratio.

5.2 Suggestions

1. **Strengthen District-Level Demographic Planning:** Government agencies should use district-level population trends to design differentiated policies for areas experiencing rapid growth, population ageing, migration or demographic stagnation.
2. **Improve Gender-Sensitive Demographic Policies:** Despite the improvement in sex ratio after 1971, continued attention should be given to female education, economic participation, health and social security to sustain favourable gender outcomes.
3. **Integrate Historical Demographic Evidence into Planning:** Long-term census trends should be incorporated into population and urban planning so that contemporary policies recognise the historical trajectory of demographic change rather than relying exclusively on recent population figures.
4. **Develop Better Migration Data Systems:** Regular and detailed migration statistics should be maintained to understand interstate, rural–urban and urban–urban migration and their implications for employment, housing and public infrastructure.
5. **Promote Region-Specific Urban and Social Infrastructure:** The continuing growth of Karnataka's population requires coordinated investment in housing, transport, education, healthcare, water supply and employment opportunities, particularly in rapidly urbanising regions.

CHAPTER 6: CONCLUSION AND FUTURE SCOPE FOR RESEARCH

6.1 Conclusion

The study of Karnataka's historical demography reveals a profound transformation in the state's population structure over the twentieth and early twenty-first centuries. Karnataka's population increased from 13.05 million in 1901 to 61.10 million in 2011, representing an overall increase of approximately 368%. The demographic trajectory was not uniform: population growth was modest in the early decades, declined by 1.09% during 1911–1921, and subsequently accelerated, reaching a maximum decadal growth of 26.75% during 1971–1981. Thereafter, growth progressively moderated to 21.12% in 1991, 17.51% in 2001 and 15.60% in 2011. This pattern reflects a transition from rapid demographic expansion towards a slower growth regime. The official Census A-02 series, which adjusts historical populations to 2011 administrative boundaries, provides the principal empirical basis for this longitudinal assessment.

The study also demonstrates important changes in Karnataka's gender composition. Although the male and female populations increased substantially throughout the period, the sex ratio declined from 983 females per 1,000 males in 1901 to 957 in 1971, before improving to 973 in

2011. The statistical analysis further established a very strong positive relationship between census year and population ($R = 0.995$; $R^2 = 0.990$; $p < 0.001$), confirming the significance of the long-term population trend. However, the relationship between population and sex ratio was weak and statistically insignificant ($r = -0.301$; $p = 0.342$). Thus, Karnataka's demographic history cannot be explained through population expansion alone; changes in gender composition and broader social transformation require consideration of literacy, urbanisation, migration, occupational change and regional disparities. The findings reinforce the importance of historical census evidence for understanding Karnataka's contemporary demographic structure.

6.2 Future Scope for Research

Future research can extend this study by developing a district-level longitudinal demographic database incorporating literacy, urbanisation, migration, occupational structure, population density and gender indicators. Such a database would permit more advanced statistical techniques, including panel regression, cluster analysis and spatial analysis, while enabling comparison between historically different regions of Karnataka. Further studies may also reconstruct the 1871–1901 demographic history using historical administrative boundaries and examine the effects of major historical events, migration streams, industrialisation and urban development on population change. The availability of detailed Census migration datasets, including information on place of last residence, duration and reasons for migration, provides additional scope for investigating the changing nature of population mobility in Karnataka.

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