Change in Religious Composition across Districts in India from 2001 to 2011

A Descriptive Analysis of the Religion Census

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There are more than a billion people in India with diverse religious beliefs, and understanding the changes in the religious composition over time can be insightful from a cultural, social, and political standpoint. Using the census data on religion from 2001 to 2011 to describe the changes in religious composition across 640 districts in India, we find that the share of the population of a religious group appears to depend on the differences in growth rates across religions (and not on the absolute growth rates of any given religion) and the baseline share of religion in the previous period. Similar growth rates across religions will still generate different compositions in the districts, underscoring the importance of understanding religious composition in contextual terms.

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With more than a billion people, the religious diversity of India is a unique social and cultural phenomenon (Clothey 2006). Even though Hinduism is the dominant religion with a 79.8% share in the religious population (Office of the Registrar General and Census Commissioner 2011), India is home to people with diverse religious beliefs and practices. The prominent among them in terms of size of the population are Muslims, Christians, Sikhs, Buddhists, Jains, and other religions and persuasions, including those who do not wish to state their religion (PIB 2015). It is, however, important to highlight that the religious diversity of India is dynamic, where, over time, the composition of religious groups in the population has changed and will continue to do so in the future. In this paper, we document the change in the population share of different religious groups from 2001 to 2011 at the district level across India.

Our focus on changes in the share of the religious population at the district level is motivated primarily by three factors. First, understanding the change in religious composition is important for narratives on the social fabric of the nation. For example, a recent nationally representative survey on religious tolerance and segregation revealed that even though the majority of Indians respect all religions, however, across all major religious groups, most individuals identify themselves as very different from people of other religions. Moreover, across all religions, a substantial percentage of people would not prefer a person from another religion as a neighbour (Sahgal et al 2021).

Second, a change in the share of the religion's population is driven not only by differences in growth rates of the religion's population (irrespective of whether absolute growth rates of the religion's population are positive or negative) but also depends on the religious composition in the previous period. A key implication of this is that variations in growth rates among different religious groups will affect districts differently. In districts where one religious group constitutes a significant majority, the change in population share due to these growth rate differences will be much smaller compared to districts where religious groups are more evenly spread out.

Third, we focus on the district, primarily because analyses at the all-India or state level give greater weightage to the larger districts while crowding out the dynamic changes in smaller districts. India is a large and diverse country where the district's population can vary from approximately 8,000 to 1.1 crore

(Office of the Registrar General and Census Commissioner 2011). Furthermore, an internal migration or conversion can affect a change in a district's religious composition, which might not be reflected in the aggregate data at the all-India or state level. Therefore, our analysis is at the administrative level of the district for which comparable religious data is available from the census. Our study uses data from Censuses 2001 and 2011, for which the district-level data is available.

In light of our emphasis on change in the share of religious composition across districts, we focus on the following aspects for three major religious groups: Christians, Hindus, and Muslims. First, we compare the distributions of growth rates for each religious group across all the districts between 2001 and 2011. Next, we describe the change in religious composition across all Indian districts between 2001 and 2011. We explored correlations between the share of a specific religion in 2001 with the share of that religion in 2011. These correlations are investigated for shares of different religions as well. Next, we examine the relationship between the change in religious composition from 2001 to 2011 and the proportion of the same religion in 2001, as well as the relationship between this change and the proportion of other religions in 2001.

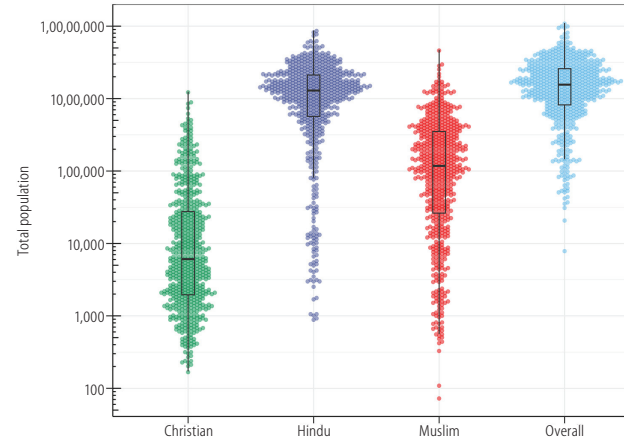
To our knowledge, this is the first paper that looks at the change in religious composition at the district level. There are, however, reports that have looked at changes in religious composition at the all-India and state levels (Kramer 2021). In addition, some studies have focused on the population growth rates of religious groups from geographic (Brush 1949; Davis 1962), demographic (Kulkarni 1996; Joshi et al 2003; Premi 2004), and socioeconomic perspectives. The primary focus of these studies was to quantitatively decompose religious population growth by factors such as fertility, mortality, and migration (Kulkarni 1996; Kulkarni and Alagarajan 2005; Reddy 2003). However, we found no evidence or analysis of religious population composition at the sub-population or district level. Given the significance of a district as an administrative unit and religion's social and political role in people's lives, we need a deeper understanding of the nature and extent of the changing religious landscape at the district level, which is the primary focus of this paper.

Data and Results

Data on religion at the district and the subdistrict levels for our analysis is from Census 2001 and 2011 (Office of the Registrar General and Census Commissioner 2001, 2011). However, in 2001, there were 593 districts, and by 2011, some districts were divided to form new districts, and in rare instances, subdistricts from two districts were combined to create new districts. As a result of this delimitation exercise, there were 640 districts in India when the census was conducted in 2011. For our analysis, we use the subdistrict data from Census 2001 and reconstruct the 640 districts in 2001.

Overall, the population growth in India from 2001 to 2011 was 17.7%. The dominant religion was Hindu in both censuses. The fastest population growth was among Muslims at 24.6%, and the lowest was among Jains at 5.4%. The share of the Hindu population declined from 80.46% in 2001 to 79.8% in 2011, a decline of approximately 0.7%. The percentage of the Muslim population increased from 13.43% in 2001 to 14.23% in 2011, an increase of 0.8%. Notably, the share of people who do not wish to state their religion has increased more than three times from 0.07% to 0.24% from 2001 to 2011 (Table 1).

Figure 1: Distribution of Total Population across 640 Districts by Religious Groups, 2011



	Christian	Hindu	Muslim	Overall
Mean	43,468	15,09,777	2,69,133	18,91,961
Median	6,080	12,91,930	1,17,692	15,57,367
Minimum	171	873	74	8,004
Maximum	12,48,137	87,16,055	47,07,573	1,10,60,148

Source: Same as Table 1.

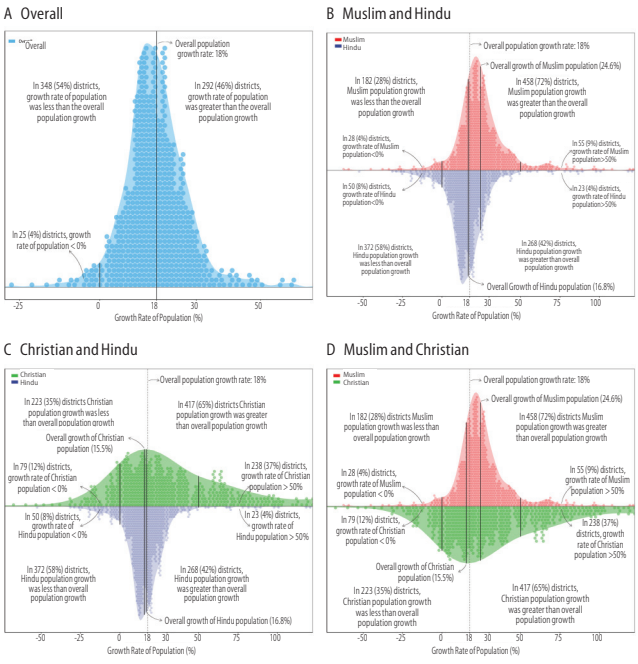
At the disaggregated district level, we found a wide variation in the population size in 2011. For example, there was a district with a population of 8,004 and another with more than 1.1 crore. The median district had a population size of approximately 16 lakh. When we looked at the variation for different religions, we found that among Christians, the median district had a population of 6,080, and there was a district with a minimum Christian population of 171. At the same time, there was a district with a maximum Christian population of approximately 12 lakh. Among the Hindus, the median district had a Hindu population of roughly 13 lakh. At the same time, there was a district with a Hindu population of 873 and another with a Hindu population of approximately 87 lakh. Among the Muslims, the median district had a population of approximately 1,17,000. At the same time, there was a district with a Muslim population of 74 and another with a population of approximately 47 lakh. These results highlight

Table 1: Summary of the Distribution of Population across Religions and the Growth Rates

	Census 2001	Census 2011	Growth Rate (%)
Overall	1,02,86,10,328 (100%)	1,21,08,54,977 (100%)	17.7
Hindu	82,75,78,868 (80.46%)	96,62,57,353 (79.80%)	16.8
Muslim	13,81,88,240 (13.43%)	17,22,45,158 (14.23%)	24.6
Christian	2,40,80,016 (2.34%)	2,78,19,588 (2.30%)	15.5
Sikh	1,92,15,730 (1.87%)	2,08,33,116 (1.72%)	8.4
Buddhist	79,55,207 (0.77%)	84,42,972 (0.70%)	6.1
Other religions and persuasions	66,39,626 (0.65%)	79,37,734 (0.66%)	19.6
Jain	42,25,053 (0.41%)	44,51,753 (0.37%)	5.4
Religion not stated	7,27,588 (0.07%)	28,67,303 (0.24%)	294.1

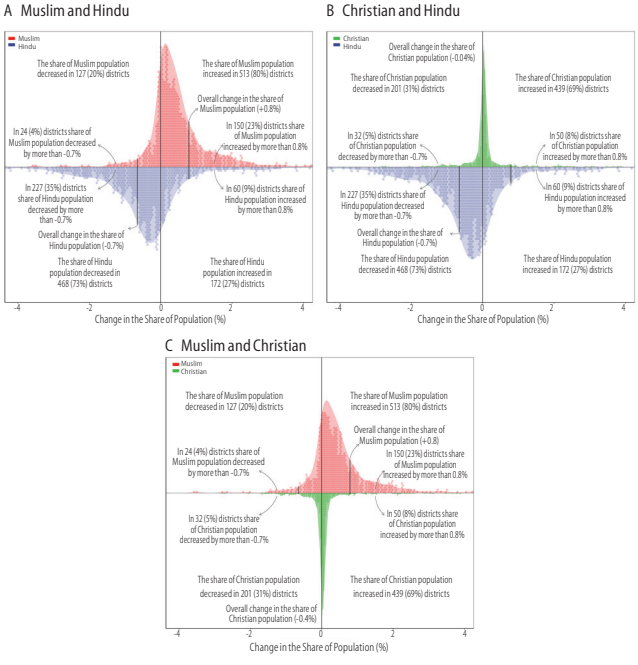
The shares are in the brackets.
Source: Office of the Registrar General and Census Commissioner (2001, 2011).

Figure 2: Distribution of Growth Rate of Population from 2001 to 2011 across 640 Districts



Source: Same as Table 1.

Figure 3: Distribution of Change in Share of Population from 2001 to 2011 across 640 Districts



Source: Same as Table 1.

the variability in population size across districts, which motivates our district-level analysis (Figure 1, p 56).

Distribution of Growth Rates

Before we proceed with the results of the change in the share of the population of a religious group across districts, it is essential to look at the distribution of the growth rates of religions across the districts. As we explain in the Supplementary Analysis section, the change in the share of religion is related to differences in growth rates across religions. When we look at the distribution of the growth rates across districts, we found 348 (54%) districts where the population growth rate was less than the overall population growth of approximately 18%. There were 25 (4%) districts where the population in 2011 was less than the population in 2001, and therefore, the population growth rate was less than zero percent.

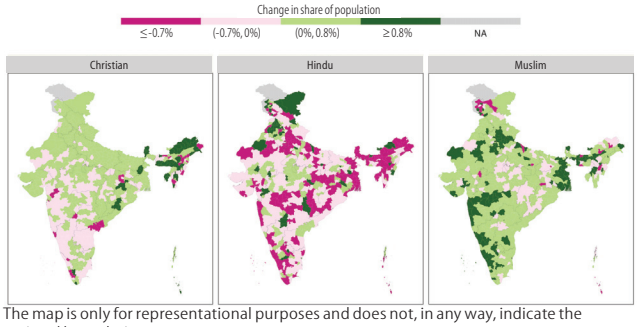
Next, we compare the distribution of population growth rates across districts for Christians, Hindus, and Muslims. We found that among the Muslims, there were 458 (72%) districts where the growth rate of the Muslim population was greater than the overall growth rate of 18%. There were 268 (42%) districts where the Hindu population growth was greater than the overall growth rate of 18%, while for the Christians, there were 417 (65%) districts whose population growth rate was more than the overall population growth rate. It is also interesting to note that in 79 (12%) districts, the Christian population growth rate was less than zero, while the corresponding number of districts for Hindus and Muslims—where their population growth was less than zero—was 50 (8%) and 28 (4%), respectively. At the other extreme, we found that there were 238 (37%) districts where the Christian population grew by more than 50%, while the corresponding number for Hindus and Muslims, where their population grew by more than 50%, was 23 (4%) and 55 (9%), respectively (Figure 2).

Distribution of Change across Districts

Our next set of results looks at the distribution of the change in the share of the population across the districts for Christians, Hindus, and Muslims. We created two benchmarks to facilitate a broad interpretation (i) based on the overall change in the share of the Hindu population, which was approximately -0.7%, and (ii) based on the overall change in the share of the Muslim population, which was approximately +0.8%. First, the share of the Muslim population increased (from 2001 to 2011) in 513 (80%) of the districts. The share of the Hindu population increased in 172 (27%) districts, and the share of the Christian population increased in 439 (69%) districts. In 150 (23%) districts, the share of the Muslim increased by more than +0.8% (the overall change in the share of the Muslim population); correspondingly for Hindus and Christians, the share of their population increased by more than +0.8% in 60 (9%) and 50 (8%) districts, respectively. In 227 (35%) districts, the share of the Hindu population decreased by more than -0.7%, while the corresponding decline in the number of districts for Muslims and Christians was 24 (4%) and 32 (5%), respectively (Figure 3).

We also plot the geographical distribution of the change in the share of the population across the 640 districts. We found a substantial increase (greater than +0.8% increase) in the share of the Christian population in the north-eastern states, particularly Arunachal Pradesh, Meghalaya, and Sikkim. The share of the Hindu population has declined substantially (a decline of more than 0.7%) across many parts of the country, in the north-eastern states, West Bengal and Assam in the east,

Figure 4: Geographical Distribution of Change in the Share of Religion between 2001 and 2011 across Religion and Districts



The map is only for representational purposes and does not, in any way, indicate the national boundaries.
Source: Same as Table 1.

and in the north-western districts of Uttar Pradesh. We also found a substantial change in the coastal districts of Maharashtra, Karnataka, and the Malabar region in Kerala. Central districts in Maharashtra, Chhattisgarh, and Odisha have also experienced a substantial decline in the share of the Hindu population. For Muslims, there was a considerable decline in the share in districts in Jammu and Kashmir. However, the central districts in Maharashtra, the coastal districts in Maharashtra, Karnataka, and the Malabar region, and the eastern districts in West Bengal and Assam experienced a substantial increase in the share of the Muslim population (Figure 4).

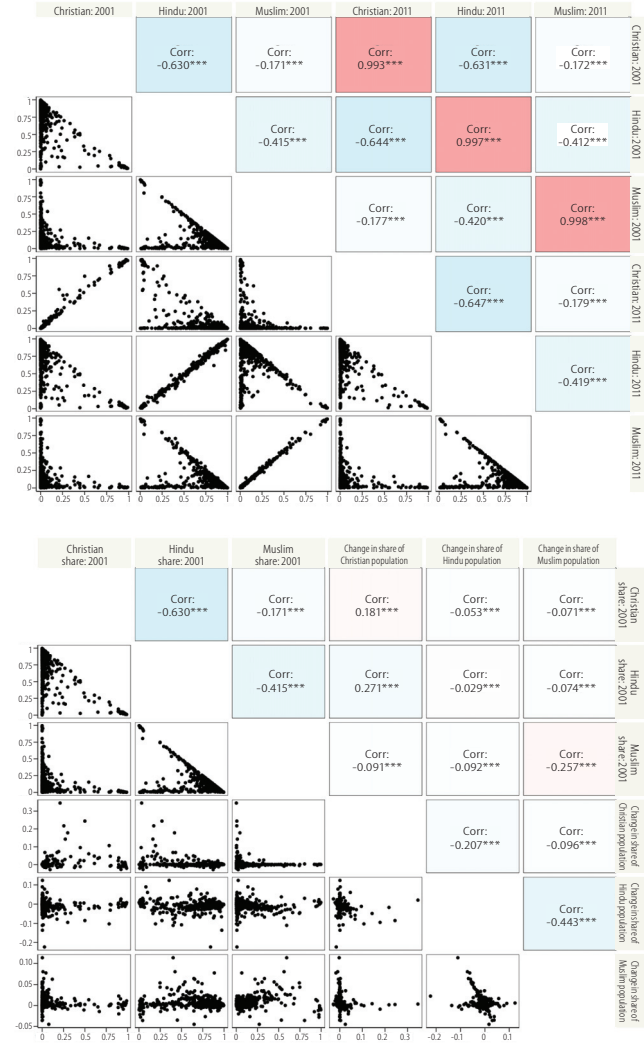
Analysing Correlations

Our next set of results is based on the pair of correlations across religions between the share of the population in the districts in 2001 and 2011. We also correlate across religions the change in the share of the population with the share of the population in 2001 and 2011. We found that the correlation between the share of the Christian population in 2001 and the share of the Hindu population in 2001 was -0.63, and this correlation decreased marginally to -0.65 in 2011. When we compared the population share between Hindus and Muslims in 2001 and 2011, the correlation was -0.42 in 2001 and 2011, while the correlation between Muslims and Christians in 2001 and 2011 was -0.17 and -0.18, respectively. When we correlate the change in the share of the population between 2011 and 2001 and the share of the population in 2001 across districts and religions, we find that for the Christians, it was 0.18; for the Hindus, it was 0.03, and for the Muslims, it was 0.26. It is also worth noting that when we correlated the change in the Christian population's share with the Hindu population's share in 2001 and the Muslim population's share in 2001, the correlation was -0.27 and -0.09, respectively (Figure 5).

Our final set of results relates to the change in the share of the population from 2001 to 2011 across religions and districts with the share of the population in 2001. We used the locally estimated scatterplot smoothing (LOESS) methods to discern if there was a pattern between the change in the share of the population between 2001 and 2011, and the share of the religion in 2001 across districts. We do this for Christians, Hindus, and Muslims.

For the Hindus, we found a U-shaped relationship across all religions. The smooth curve suggests that the decline in the

Figure 5: Correlation Matrix for Religions' Share in Total Population in 2001 and 2011

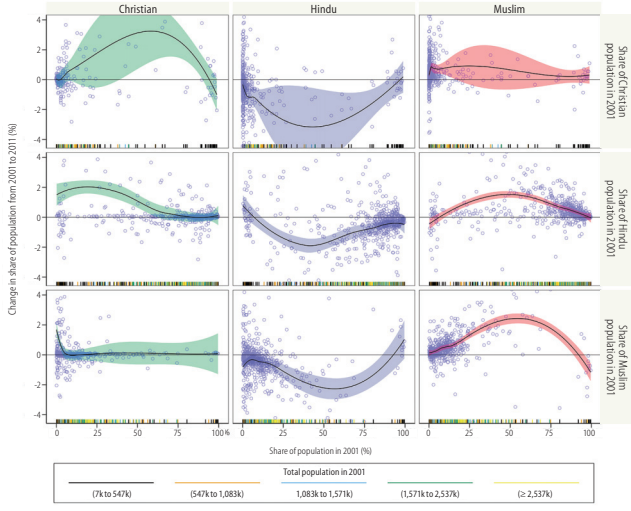


Source: Same as Table 1.

share of the Hindu population was higher as the share of the population increased from ~0% to ~60%, and then decreased as the share of the Hindu population increased from 60%. For the Muslims, we observed an inverted U-shaped relationship between the increase in the share of the Muslim population and the increase in the share of the Muslim and Hindu populations, respectively. However, we did not find any discernible pattern between the change in the share of the Muslim population between 2001 and 2011 and the share of the Christian population in 2001 across the districts.

For the Christians, we observed an inverted U-shaped relationship between the increase in the population share and the Christian population's share in 2001. Concerning the share of the Muslim population in 2001, there was no discernible pattern. However, for the share of the Hindu population in 2001, we found that the change in the share of the Christian population was greater for lower values of the share of the Hindu population in 2001. For districts with a share of the Hindu population over ~75%, the change in the share of the Christian population was marginal (Figure 6, p 59).

Figure 6: Association between Change in the Share of Population from 2001 to 2011 and Share of Population in 2001 across 640 Districts



Source: Same as Table 1.

Discussion

This paper makes two distinct contributions. First, we document the diversity in the change in the religious landscape at the district level, which is typically masked when we exclusively focus at the aggregate national or state level. Second, we theoretically and empirically establish that the change in the share of religious composition does not depend on the absolute growth levels of a religion but on the differences in growth levels, and the share of religion in the previous period.

We find that the share of the Hindu population has declined in 468 (73%) districts, while in 227 (35%) districts, it has reduced by more than 0.7% (which is the overall decline in the share of the Hindu population). We also observed a U-shaped pattern in the fall in the share of Hindus between 2001 and 2011 and the share of the Hindu population in 2001. The decline was the lowest in districts with a substantial share of the Hindu population (more than 80%), or where the share of the Hindu population was less than 20%, and was higher in districts where the share of the Hindu population was between 20% and 80%. We observed a similar pattern of decline in the share of the Hindu population when we compared it to the share of the Muslim population in 2001. In contrast, the reverse was true when we looked at the association between the change in the share of the Muslim population from 2001 to 2011 and the share of the Muslim and Hindu population in 2001.

This result highlights an important relationship between changes in the share of a religion's population between the two periods, the differential growth rates of religions, and the share of religion in the previous period (see Supplementary Analysis section). We illustrate this with an example. Consider two districts (A and B) with the same growth rate of the Muslim population (say at 30%), while the growth rate of the Hindu population is 25%. However, the only difference between the two districts is that in District A, the share of the Hindu population is 50%, while the share of the Hindu population in District B is 95%. Given the same difference in growth rate between the Hindu and Muslim populations, we show that in District A, where the share of the Hindu population was 50%, the increase in the share of the Muslim population would be 1%. In contrast, in District B, where the share of the Hindu population was 95%, the increase in the share of the Muslim population would be 0.2%, which is five times less than in District A.

Furthermore, it is important to emphasise that even with negative growth rates (perhaps due to declining fertility rates), we will observe a similar pattern of changing religious composition as long as the difference in growth rates across religions is positive. For example, if the growth rate of the Muslim population was -25% and the growth rate of the Hindu population was -30%, then the increase in the share of the Muslim population in District A, where the share of Hindu population was 50%, would be 1.7%. At the same time, in District B, where the share of the Hindu population was 95%, it would be 0.3%, which is almost six times less than that of District A.

An important implication of this theoretical result, empirically confirmed from the data, is that to understand the nature and extent of change in religious composition, we need to look at the differential in growth rates across religions. Additionally, we also need to focus on the population share of the religion in the previous period. This point is also reflected in the all-India population trends of major religions from 1961–2001, documented by Kulkarni and Alagarajan (2005). For example, between 1961 and 1971, the Muslim population grew by 30.84%, while the overall growth in population was 24.75%, and the share of the Muslim population increased from 10.69% to 11.21% (a 0.52% increase in share). However, between 1991 and 2001, the Muslim population grew by 29.49% while the overall population grew by 21.53%, and the share of the Muslim population increased from 12.61% to 13.43% (a 0.82% increase). Moreover, it is important to mention that since 1991, the decadal increase in the share of the Muslim population has stabilised around 0.8%, while between 1961 and 1981, the decadal increase in the share of the Muslim population was around 0.5%.

In contrast to state or national level, district-level analysis brings out the rich variations across differential growth rates of religions, the share of religions, and the change in the share of religions across districts. Our district-level analysis also reveals an interesting pattern concerning the distribution of growth rates, particularly for Christians. We found significant variations across districts in the growth rates of the Christian population. For example, at an aggregate level, the growth rate of the Christian population was 15.5%, lower than the overall growth of 17.7%. However, a district-level analysis revealed wide variations. While there were 79 (12%) districts where the growth rate of the Christian population was negative, in contrast, there were 238 (37%) districts where the Christian population grew by more than 50%. This wide variation in growth rates of the Christian population across districts necessitates a more nuanced and detailed exploration of factors over and beyond the fertility rates that capture the wide variations across districts (Kulkarni and Alagarajan 2005; Quraishi 2021).

The analysis is based on the Census data of 2001 and 2011, which is more than a decade from now. Therefore, the critical limitation of this paper is that its findings might be outdated. However, this is the latest data on the population of religious groups that is presently available. Nevertheless, they reveal interesting patterns in India's changing religious composition at the district level. Using the Census data from 2001 and 2011, this paper has looked at the changing religious composition at the district level. Given the diversity of Indian districts in population size, our analysis reveals interesting patterns at the district level between changes in the share of a religion's population across two periods and the previous period's share of the religion's population. These patterns have significant social, cultural and political consequences.

Supplementary Analysis

Consider a district with two groups, *M* and *H*. In period *t*, the

$\text{total population}_t = \text{M population}_t + \text{H population}_t$, and the

$$\text{share}_t^M = \frac{\text{M population}_t}{\text{Total population}_t}$$

$$\text{change in share of M population} = \Delta\text{share}^M = \frac{\text{M population}_{t+1}}{\text{Total population}_{t+1}} - \frac{\text{M population}_t}{\text{Total population}_t},$$

$\text{M population}_{t+1} = \text{M population}_t \times (1 + \text{growth of M})$,

$\text{Total population}_{t+1} = \text{Total population}_t \times (1 + \text{growth of total population})$,

$\text{growth of total population} = \text{share}_t^M \times \text{growth of M} + (1 - \text{share}_t^M) \times \text{growth of H}$,

$$\therefore \Delta\text{share}^M = \left(\frac{\text{M population}_t \times (1 + \text{growth of M})}{\text{Total population}_t \times (1 + \text{growth of total population})}\right) - \left(\frac{\text{M population}_t}{\text{Total population}_t}\right)$$

$$\Delta\text{share}^M = \frac{\text{M population}_t}{\text{Total population}_t} \times \left(\frac{\text{growth of M} - \text{growth of total population}}{1 + \text{growth of total population}}\right),$$

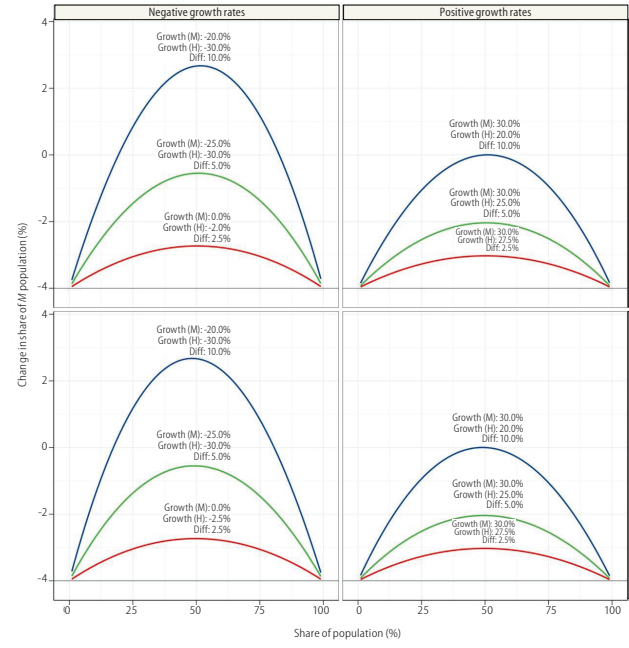
$$\Delta\text{share}^M = \text{share}_t^M \times \left(\frac{\text{growth of M} - \text{growth of total population}}{1 + \text{growth of total population}}\right),$$

Substituting for the growth of the total population, we get the following expression for the change in the share of *M*'s population:

$$\Delta\text{share}^M = \frac{\text{share}_t^M \times \left(1 - \text{share}_t^M\right) \times (\text{growth of M} - \text{growth of H})}{\text{share}_t^M \times (\text{growth of M} - \text{growth of H}) + (1 + \text{growth of H})},$$

$$\Delta\text{share}^M = \text{share}_t^M \times \left(1 - \text{share}_t^M\right) \times \frac{(\text{growth of M} - \text{growth of H})}{\text{share}_t^M \times (\text{growth of M} - \text{growth of H}) + (1 + \text{growth of H})}.$$

Supplementary Figure 1: Simulations of Association between Change in Share of Population and the Share of Population According to Differences in Growth Rates



Source: Authors' calculations.

From this equation, it is evident that the change in the share of population for group *M* is positively related to the difference in the growth rate of *M*'s population and the growth rate of the *H* group. It is also important to note that even with negative growth rates of the two groups, the share of *M*'s population will increase as long as the *growth of M–growth of H>0*. We also observe that for the same difference in growth rates between *M* and *H*'s populations, the change in the population share for group *M* is non-linearly related to the share of the population of group *M* in time *t*. At extreme values where $share_t^M \approx 0$ *or* 1, the change in the share of the population of group *M* will be ≈ *0*. Simple simulations (Supplementary Figure 1) reveal that the change in the share of *M*'s population for a given difference in growth rates has an inverted U-shaped relationship with the share of the population in period *t*. The relationship would be reversed if the *growth of M–growth of H<0*.

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