

From Boom to Bust: Unpacking India's Fertility Decline

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Abstract

As the world grapples with shifting demographics, India stands at the epicentre of a profound transformation. This research delves into the intricate interplay of culture, fertility, and policy, dissecting the enigma of declining Total Fertility Rates (TFRs). Global trends are juxtaposed with the Indian context. The paper challenges the validity of Malthusian principles and explores the multifaceted causes behind India's dwindling fertility rates. Consequences ripple across generations: an aging populace, labour shortages, and an impending birth crisis. Drawing insights from international experiences, the paper proposes tailored policy interventions. It advocates for the adoption of a nationwide Two-Child Policy in states with TFRs nearing or exceeding 2.0, while recommending a Three-Child Policy to promote sustainable growth in regions where rates fall below 1.0. As India navigates through this intricate terrain, the pursuit of equilibrium emerges as the overarching goal a future where cultural heritage, fertility aspirations, and pragmatic policy converge harmoniously.

Keywords: Total fertility Rate; Demographic shift; Population Sustainability; Birth crisis; National child policy; Malthusian principles.

INTRODUCTION

The dynamics of global population growth have undergone significant transformations over the past century, with one of the most notable shifts

being the decline in fertility rates across diverse regions. In the annals of human history, the survival of our species hinged upon the ability to propagate genes through successive generations. In an era when infant mortality was tragically high, those individuals endowed with the capacity to bear more children held a distinct advantage. Natural selection favoured genes associated with higher fertility, ensuring the perpetuation of our lineage over millennia.

Total Fertility Rate (TFR), the average number of offspring borne by a woman during her reproductive years, was finely tuned to safeguard the survival of at least some progeny. Yet, the landscape has shifted dramatically. In today's developed world, child survival is markedly more certain due to advances in healthcare, nutrition, and

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sanitation. Consequently, the evolutionary forces that once favoured high fertility genes are no longer as pronounced. As we navigate this transition, we witness a gradual decline in the occurrence of these once-prevalent genes. The intricate dance between cultural shifts, socio-economic progress, and individual choices reshapes our reproductive patterns. To comprehend this phenomenon, we can draw parallels from the animal kingdom. In the context of dairy cattle, farmers often select for traits that are beneficial for production, such as milk yield. If high fertility is not a trait that is being actively selected for, then over time, the fertility rates of the cattle may decrease. This is because without selective pressure to maintain or increase fertility, other traits may become more prevalent in the population, leading to a gradual decline in reproductive rates. Applying this analogy to human populations, particularly in the context of India, it suggests that as societal needs and values change, so too do the traits that are '*selected*' for, either consciously or unconsciously. In modern times, factors such as economic stability, education, and access to healthcare have become more important, and these factors tend to correlate with lower fertility rates. As such, in the absence of pressures or incentives to have larger families, fertility rates naturally decline. This analogy is used to illustrate how shifts in societal values and priorities can influence reproductive patterns, much like how selective breeding practices can influence the traits of a population of animals. As we delve deeper into the causes and implications, we unravel a narrative that transcends mere statistics a story of adaptation, choice, and the delicate balance between tradition and progress.

Global Fertility Trends

Between 1990 and 2008, developing nations experienced a remarkable decline in fertility rates, resulting in a halving of maternal deaths per 1000 women. During this period, the global fertility rate decreased from 5 to 2.5 births per woman. In industrialized countries, such as post-World War II America, the TFR surged from 2.9 births to 3.7 births by 1957. In contrast, Japan witnessed a decline in TFR from 4.5 births in 1947 to 2 births by 1957, influenced by nationalist policies, abortion law liberalization, and socio-political changes. Meanwhile, developing countries like China and Bangladesh successfully addressed fertility rates. China implemented population reduction programs, leading to a controversial one-child policy in 1979. Bangladesh saw a remarkable reduction in TFR from 6 births to 2.4 births between

1975 and 2010, highlighting the effectiveness of targeted policies and interventions (Cleland, 2008). Between 1984 and 1997, South Korea's TFR fluctuated within a narrow range between 1.5 and 1.8 children per woman. However, after the 1997 financial crisis, fertility declined to less than 1.5. By 2005, the TFR had dropped to 1.08, highlighting the severity of the decline (Lee & Hyojin Choi, 2015). South Korea's fertility rate is the lowest among OECD member countries, and the rate of decline is the fastest. It is the only OECD country with a TFR of less than one child (Jiyeon Yoon, Sunghee Kim, & Jihyun Jang, 2022). The year 2010 marked a notable demographic transition, characterized by a decrease in family size alongside increased national prosperity, leading to improved life expectancy and reduced infant mortality rates in whole world (Dyson, 2010). By the end of the century, 183 out of 195 countries are projected to have Total Fertility Rate (TFR) values below replacement level, highlighting a global trend towards declining birth rates (Vollset & *et al*, 2020).

Definitions (UNFPA, India's Population Growth and Policy Implications, 2023)

- a. **TFR:** The average number of children a woman would have by the end of her childbearing years, if she bore children at the current agespecific fertility rates
- b. **WFR:** The average number of children a woman would have by the end of her childbearing years minus unwanted births, if she bore children at the current age-specific fertility rates
- c. **Crude BR:** Number of live births per 1,000 population in a given year
- d. **Mistimed B:** A birth that occurred when a woman did not intend to bear a child, even though she desired having a child later
- e. **Unintended birth:** A birth that occurred when a woman did not want to have any children at all, or any more children.

Indian Scenario

In the context of India, which is the highly populous nation in the world, where cultural norms, education, and economic aspirations intersect, the decline in TFR reflects a complex interplay of factors. India's crude birth rate declined significantly from 1971 to 2000, leading to a drop in the number of children born per 1000 population. Despite this, the Total Fertility Rate (TFR) fell below replacement level, reaching 2 in 2021, marking India's transition to the third stage of demographic change (Fig. 1). However, the population continues

to grow due to population momentum, driven by a large cohort of young people now entering reproductive age. This underscores the intricate interplay between fertility, population dynamics, and societal shifts shaping India's demographic landscape (UNFPA, 2023). The Women's Fertility

Rate (WFR) for the age group of 15-49 years, as reported in the National Family Health Survey (NFHS-5), stands between 1.6 and 2.0, indicating a moderate level of fertility within this demographic segment (UNFPA, India's Population Growth and Policy Implications, 2023).

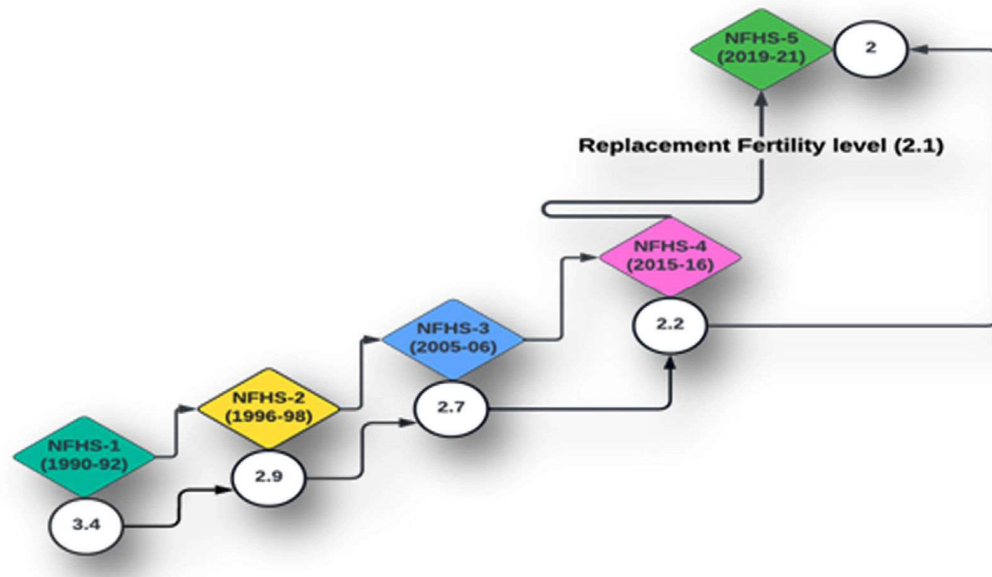


Fig. 1: Total Fertility Rate of India-Source: NFHS-1 (1990-92), NFHS-2 (1996-98), NFHS-3 (2005-06), NFHS-4 (2015-16) and NFHS-5 (2019-21) surveys

The crude birth rate decreased from 37 in 1971 to 20 in 2020 (Fig. 2). The decrease in the crude birth rate

in India is a multifaceted phenomenon influenced by cultural, economic, and policy-related factors.



Fig. 2: Crude birth rate of India-Sample registration system

Table 1 presents the Total Fertility Rate (TFR) for each state. According to the most recent NFHS-5 data, Bihar has the highest TFR at 3, while Sikkim has the lowest at 1.1. It's important to highlight that as of 2015-16, most Indian states had achieved a

TFR below the replacement threshold. By the close of 2021, all states, with the exception of Manipur, Meghalaya, Uttar Pradesh, Bihar, Madhya Pradesh, and Jharkhand, had TFRs below the replacement level.

According to NFHS-5, TFR among Hindus was estimated to be 1.9, while among Muslims it was 2.4. In the latest report on the religious composition of India, Pew Research Centre said that among Indian Muslims, the total fertility rate has declined dramatically, from 4.4 children per woman in 1992 to 2.6 children in 2015. Every religious group in

the country has seen its fertility fall, including the majority Hindu population and Muslim, Christian, Sikh, Buddhist and Jain minority groups. Muslims still have the highest fertility rate among India's major religious groups, followed by Hindus at 2.1. Jains have the lowest fertility rate (1.2).

Table 1: Total Fertility Rate (TFR) (Children per women) across all States and Union Territories, Source- NFHS reports, MoH & FW

States/UT's	NFHS-1 (1992-93)	NFHS-2 (1998-99)	NFHS-3 (2005-06)	NFHS-4 (2015-16)	NFHS-5 (2019-21*)
Andhra Pradesh	2.6	2.3	1.8	1.8	1.7
Arunachal Pradesh	4.3	2.5	3	2.1	1.8
Assam	3.5	2.3	2.4	2.2	1.9
Bihar	4	3.5	4	3.4	3
Delhi	3	2.4	2.1	1.8	1.6
Goa	1.9	1.8	1.8	1.7	1.3
Gujarat	3	2.7	2.4	2	1.9
Haryana	4	2.9	2.7	2.1	1.9
Himachal Pradesh	3	2.1	1.9	1.9	1.7
Jammu and Kashmir*	3.1	2.7	2.4	2	1.4
Karnataka	2.9	2.1	2.1	1.8	1.7
Kerala	2	2	1.9	1.6	1.8
Madhya Pradesh	3.9	3.3	3.1	2.3	2
Maharashtra	2.9	2.5	2.1	1.9	1.7
Manipur	2.8	3	2.8	2.6	2.2
Meghalaya	3.7	4.6	3.8	3	2.9
Mizoram	2.3	2.9	2.9	2.3	1.9
Nagaland	3.3	3.8	3.7	2.7	1.7
Odisha	2.9	2.5	2.4	2.1	1.8
Punjab	2.9	2.2	2	1.6	1.6
Rajasthan	3.6	3.8	3.2	2.4	2
Sikkim	-	2.8	2	1.2	1.1
Tamil Nadu	2.5	2.2	1.8	1.7	1.8
Tripura	2.7	-	2.2	1.7	1.7
Uttar Pradesh	4.8	4	3.8	2.7	2.4
West Bengal	2.9	2.3	2.3	1.8	1.6
Chattisgrah	-	-	2.6	2.2	1.8
Jharkhand	-	-	3.3	2.6	2.3
Uttarakhand	-	-	-	2.1	1.9
Telangana	-	-	-	1.8	1.8
Andaman and Nicobar (UT)	-	-	-	1.4	1.3
Chandigarh (UT)	-	-	-	1.6	1.4
Dadra and Nagar Haveli and Daman Diu (UT)	-	-	-	2.1	1.8
Lakshadweep (UT)	-	-	-	1.8	1.4
Puducherry (UT)	-	-	-	1.7	1.5
Ladakh (UT)	-	-	-	-	1.3

Note - In NFHS-5, Jammu Kashmir is Union Territory excluding Ladakh (UT)

* Survey done over two years

The general pattern is largely the same as it was in 1992, when Muslims had the highest fertility rate at 4.4, followed by Hindus at 3.3 (The Economic Times, 2021). There was also reported a consistent trend where rural areas exhibited a higher TFR of 3.0 compared to urban areas with TFR of 2.0 across nearly all states (Haub, 2009).

Validity of Malthusian principles of population growth and decline in TFR across the world

Malthusian Principles, named after economist **Thomas Malthus**, posit that human population will inevitably outgrow its capacity to produce food, leading to famine unless birth rates decrease. The theory claims that population growth is potentially exponential, while the growth of resources is linear, ultimately lowering living standards. It emphasizes the need for population control through natural checks (such as disasters and wars) and preventative measures (like family planning and late marriages) to avoid a **Malthusian catastrophe**. However, globally, declining **Total Fertility Rates (TFRs)** as discussed in the paper, pose challenges, impacting demographics, sustainability, and the survival of our species, thus challenging the validity of the Malthusian principles. Let's analyse each principle in light of current trends.

Malthusian Principle 1

- a. **Exponential Population Growth:** Malthus posited that population growth tends to be exponential. However, global TFR data indicates a significant decline from around 5 children per woman in the 1960s to approximately 2.4 in 2021. This decline suggests that population growth is not adhering strictly to the exponential pattern Malthus envisioned. Factors like education, urbanization, and access to family planning have influenced this shift.
- b. **Arithmetic Food Supply Growth:** Malthus also suggested that food supply increases arithmetically. Contrary to this, advancements in agriculture, technology, and global trade have led to a food supply that has grown more rapidly than Malthus predicted, outpacing population growth in many regions. Nations with higher food production often exhibit lower Total Fertility Rates (TFR), suggesting complex socio-economic factors at play in demographic trends. There exists a negative correlation between a nation's GDP and its global fertility rate, indicating that as

economic prosperity increases, fertility tends to decline (Aitken, 2022).

Malthusian Principle 2

Preventative Checks: They play a pivotal role in shaping fertility rates. These measures, including family planning, delayed marriages, and celibacy, aim to reduce birth rates and align with Malthus's principle that populations can regulate their growth to prevent overpopulation.

However, a Paradox Emerges: While these preventative methods prove effective, they are now deeply ingrained in our societal fabric.

- a. **Family Planning:** The widespread adoption of family planning methods has significantly impacted birth rates. Couples consciously choose smaller family sizes, considering factors like education, career aspirations, and economic stability. As family systems evolve, the traditional norms of large families are gradually giving way to more deliberate family planning.
- b. **Late Marriages:** Delayed marriages allow individuals to pursue education, personal growth, and professional goals. Consequently, couples often have fewer children. This shift in marital timing contributes to the declining Total Fertility Rate (TFR) across various regions.
- c. **Celibacy:** The choice to remain unmarried or childless is increasingly accepted. Whether due to personal preferences, career commitments, or other reasons, celibacy directly impacts population growth. Individuals consciously opt for this path, further influencing TFR.

Despite the effectiveness of these preventative measures, we encounter an unanticipated challenge: *there appears to be no turning back*. Once embedded in our lifestyles, these practices continue relentlessly. As family planning becomes the norm, birth rates decline steadily. But what if the decline becomes too steep?

The delicate balance lies in maintaining sustainable population levels. If birth rates plummet excessively, we risk a future where no one survives a scenario devoid of human existence. Thus, while preventative checks remain essential tools for population regulation, we must tread carefully. Our efforts to prevent overpopulation should not inadvertently lead to a population crisis.

Catalysts for the TFR decline in India

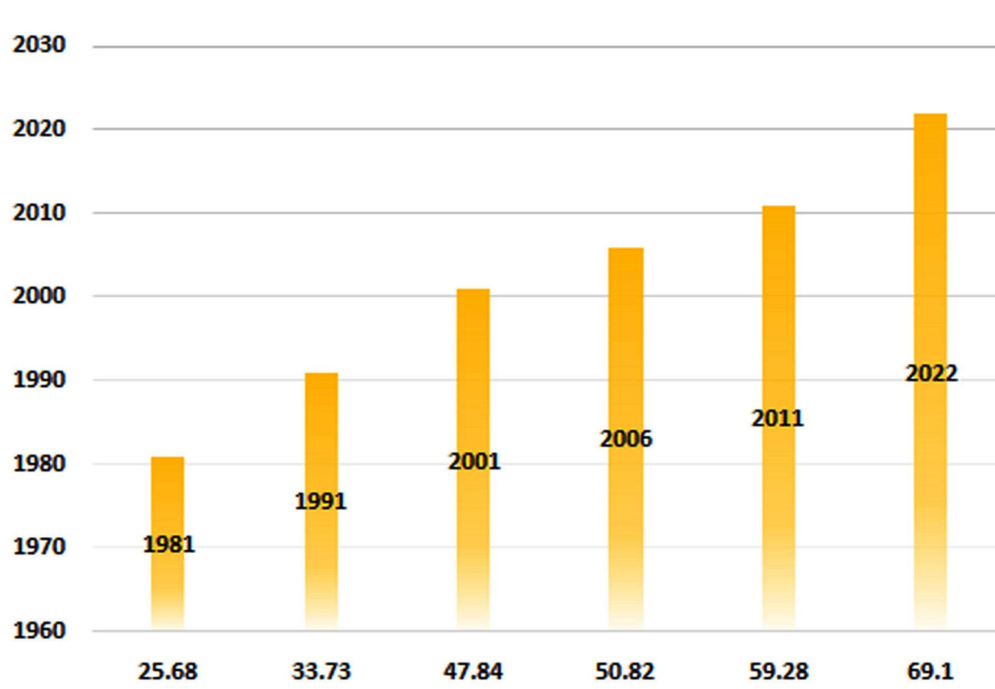
Various factors are pushing populations toward an infertility trap. Childbearing spans diverse age ranges, from early teens to over 35, with varying health risks. Over the last fifty years, there has been a significant global decline in fertility rates across all nations, attributed to factors such as rising prosperity, enhanced education for women, and a shifting focus in life goals away from solely childbearing. Fertility rates are influenced by marriage norms, lactation's impact on ovulation, contraception, and abortion, shaping population dynamics and reproductive health (Cleland, 2008). Let's delve into the holistic exploration of factors influencing the steep declining of Total Fertility Rate (TFR) in India.

Education and Literacy Rates

Educational factors play a crucial role in the decrease of Total Fertility Rate (TFR), with the education of women being particularly influential in reducing TFR. As the literacy rate of women increases, TFR tends to decrease accordingly (Liu & Raftery, 2020). As women's education levels increase, Total Fertility Rate (TFR) tends to decrease, impacted by factors such as peer pressure, perceived self-confidence, and anticipated regret. For women under 40 years old, the prime career advancement age coincides with the reproductive

age, contributing to decreased fertility rates due to the challenges of balancing professional aspirations with family planning. Additionally, access to healthcare and support systems, along with a desire to pursue professional goals over starting a large family, contribute to shifting lifestyle choices. Increasingly, life is seen as a journey towards prosperity and self-fulfillment rather than solely centered on the purpose of reproduction (Kearney & White, 2016).

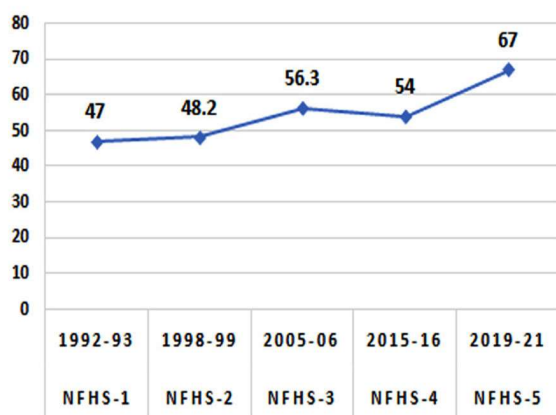
The rise in female literacy rates from 25.68% in 1981 to 69.1% in 2022 reflects significant progress in women's education (*Graph 1*). Women with higher levels of education tend to have fewer children. The TFR for literate women in India was reported at 2.1, compared to 3 for illiterate women (Pandit, 2020). This educational empowerment is closely linked to fertility choices, as literate women are more likely to have access to information on family planning, contraceptives and reproductive health. Educational attainment among women is inversely related to fertility rates. As literacy rates have climbed, it's likely that the Total Fertility Rate (TFR) has declined, as educated women tend to marry later and have fewer children. Increased female literacy can lead to greater economic participation and autonomy, further influencing fertility patterns. As women gain education, they may prioritize career and personal development, which can result in a lower TFR.



Graph 1: Female literacy rates 15 years and above (Source: World Bank 1981-2022)

Use of Contraceptives

The urban environment often correlates with a decreased Total Fertility Rate (TFR), as the cost of raising children rises and access to family planning services and contraception becomes more widespread (Aitken, 2022), a trend that is also evident in India's urban landscape.



Graph 2: Contraceptive Prevalence Rate of India
(Source: NFHS surveys)

The increase in CPR from 47% in NFHS-1 (1992-93) to 67% in NFHS-5 (2019-21) suggests a cultural shift towards family planning in India (*Graph 2*). This could be due to increased education, awareness of contraception, and women's empowerment in making reproductive choices in India. A higher CPR generally correlates with a lower Total Fertility Rate (TFR). The data indicates a societal move towards smaller family norms, influenced by various socio-economic factors, including urbanization, cost of living, and women's participation in the workforce.

Infant Mortality Rate (IMR)

Table 2: Infant mortality rate (Source: Ministry of Health and Family Welfare, 2022)

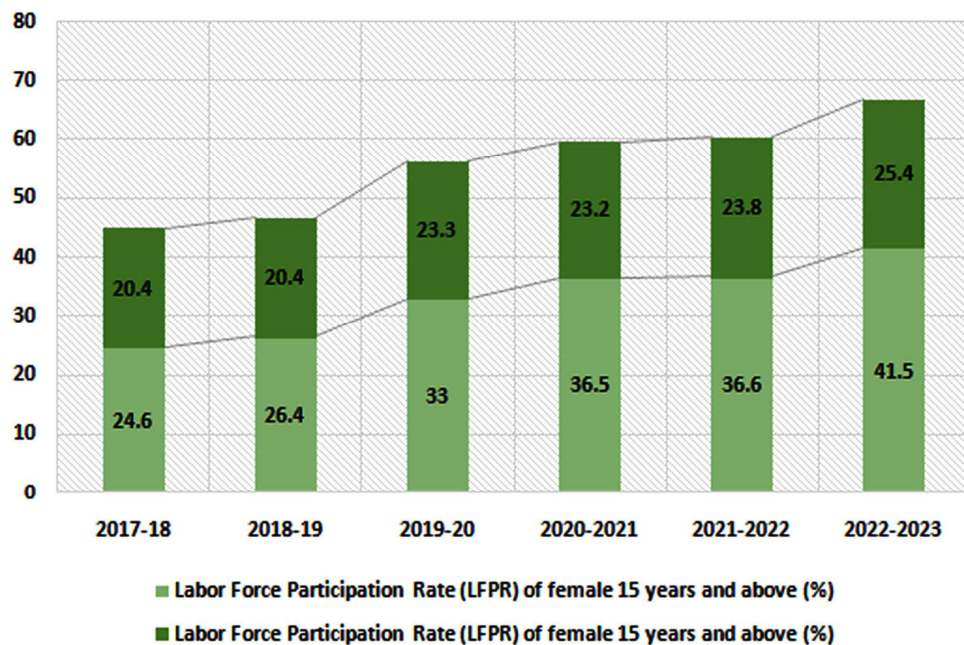
Year	Infant Mortality Rate (per 1000 live birth)
2015	37
2016	34
2017	33
2018	32
2019	30

Table 2 Shows that the Infant mortality rate in India has shown a notable decrease from 37

deaths per 1000 live births in 2015 to 30 deaths per 1000 live births in 2019. This trend can be attributed to several factors. Enhanced access to healthcare services, especially in rural areas, and better neonatal care facilities have contributed to the reduction in infant deaths. Programs like the National Health Mission and its focus on maternal and child health have played a significant role in improving survival rates. There has been a rise in awareness about the importance of vaccination, breastfeeding, and nutrition, which are crucial in the first year of a child's life. Improvements in maternal education and economic conditions have also positively impacted infant mortality rates. This downward trend is a positive indicator of progress in public health and suggests that if these efforts continue, the IMR could further decrease, leading to a healthier start to life for more children across India.

Labour Force Participation Rate (LFPR)

LFPR is defined as the percentage of persons in labour force (*i.e.* working or seeking or available for work) in the population. The LFPR is an important indicator of the share of women actively participating in the labour force, either by working or actively seeking work. A significant increase in LFPR from 24.6% in 2017-18 to 41.5% in 2022-23 in rural areas (*Graph 3*). This could be due to various socio-economic changes, including increased agricultural productivity, diversification into non-farm jobs, and government initiatives promoting female employment. A steady increase in LFPR from 20.4% in 2017-18 to 25.4% in 2022-23 in urban areas. Urban trends may be influenced by greater educational opportunities for women, the growth of the service sector, and societal shifts towards gender equality in the workforce. Higher LFPR among women is often associated with lower fertility rates, as employment can lead to delayed marriage and childbearing. The data suggests a cultural transformation where women are increasingly seen as economic agents, which can impact family dynamics and societal norms. The continued rise in female LFPR could contribute to economic growth and development. It may also lead to policy changes that support working women, such as improved childcare facilities and more flexible work arrangements.

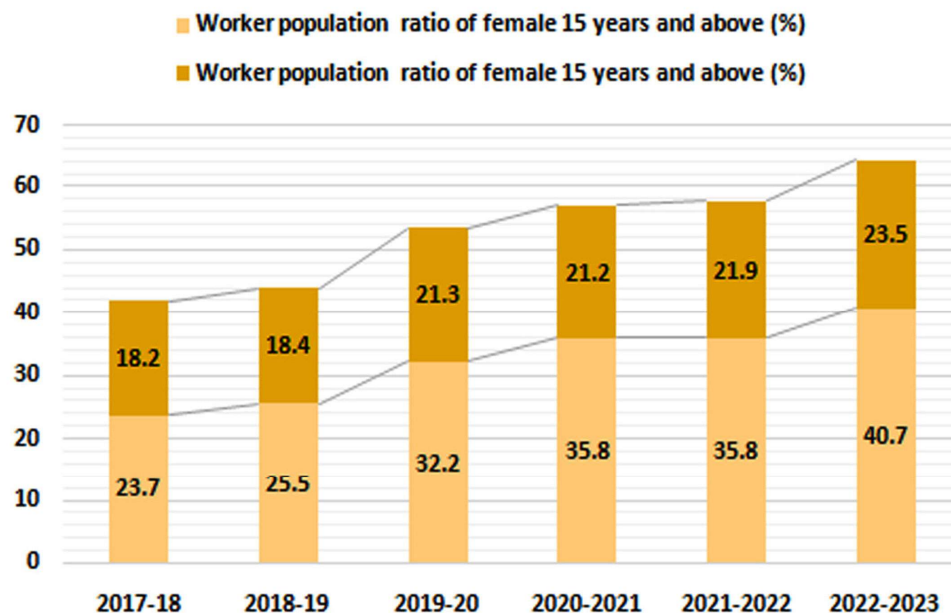


Graph 3: Labour Force Participation Rate (LFPR) of India [Source: (PIB, 2023)]

Worker Population Ratio (WPR)

WPR is defined as the percentage of employed persons in the population. The WPR represents the percentage of employed persons in the population. The data indicates a positive trend in female employment, with the WPR increasing in both rural and urban settings. There is a substantial rise in the

WPR from 23.7% in 2017-18 to 40.7% in 2022-23 in rural areas (Graph 4). This could be due to various government initiatives aimed at rural development and women's empowerment, such as the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA). The increase is more gradual, from 18.2% in 2017-18 to 23.5% in 2022-23 in urban



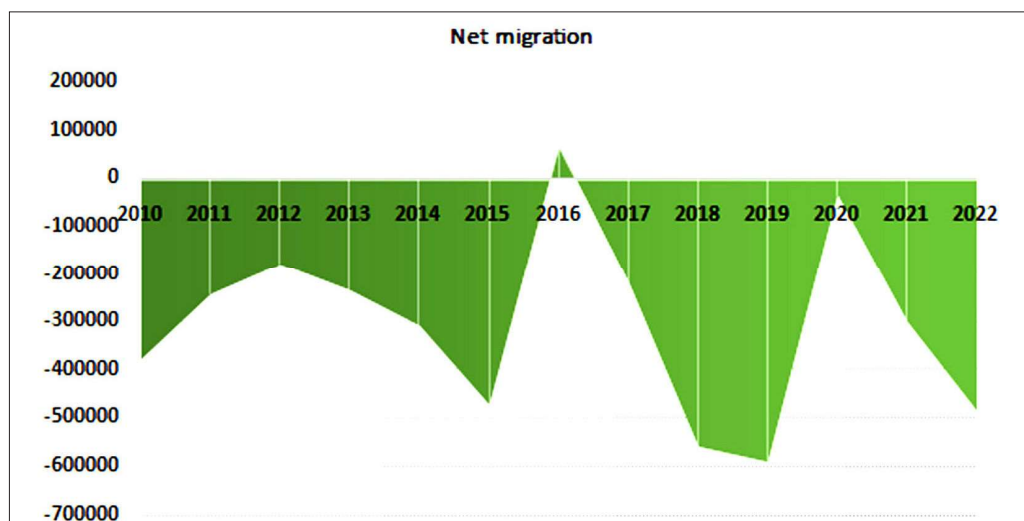
Graph 4: Worker Population Ratio (WPR) of India [Source: (PIB, 2023)]

areas. Urban employment for women may be influenced by factors like education, availability of formal sector jobs, and societal norms. An increase in female employment often correlates with a decline in fertility rates, as women may choose to delay marriage and childbirth in favour of career advancement. The economic independence associated with employment can also lead to better access to healthcare and family planning resources. Higher female WPR can lead to increased household incomes and economic growth. It may also result in shifts in traditional gender roles and contribute to more egalitarian family structures.

Migration

India is experiencing declining fertility rates, prompting significant migration to developed nations. Countries experiencing declining fertility rates, such as India witness significant emigration to

developed nations for reasons including education and employment opportunities, exacerbating demographic shifts. **Graph 5** indicates a consistent pattern of negative net migration, suggesting a higher number of emigrants over immigrants. The highest negative net migration occurred in 2019 with -593,495. The year 2016 stands out with positive net migration, indicating a unique occurrence that led to an influx of people or retention of the population. The pursuit of better job prospects abroad could be a driving factor for the negative net migration. Higher education opportunities in foreign countries might attract students from India. Many individuals emigrate to join family members who have settled abroad. Sustained negative net migration can alter the demographic composition, potentially leading to a brain drain. The government may need to evaluate and address the reasons behind the emigration trend.



Graph 5: Net migration of India (Source: The World Bank)

Age at Marriage and Childbearing

The median age of first marriage for women has increased from 17.2 years in 2005-06 to 19.2 years in 2019-21. For men aged 25-29, the median age at first marriage increased from 22.6 to 24.9 during the same period (UNFPA, Child Marriage in India: Key Insights from the NFHS-5, 2022). The latest survey reports (NFHS-5 (2019-21) that the median age at which women had their first pregnancy was 21.2 years (Govt of India, 2022). These trends indicate a shift towards later marriage and childbearing, which can be attributed to various factors such as increased education for girls, economic development, and government initiatives aimed at discouraging child marriage and promoting reproductive health.

Childlessness

In the USA, 45% of women aged 15-44 years have never had a child, reflected diverse lifestyle choices and evolved societal norms regarding family planning and parenthood. Some unmarried individuals may attribute their status to an inability to find a suitable partner, reflecting challenges in navigating relationships and meeting personal compatibility criteria (Aitken, 2022).

In India, the pattern of childlessness among married couples is evolving. A variety of elements, such as the rise in educational attainment and shifts in economic conditions, are shaping this trend. Contemporary research points to a growing prevalence of childlessness, which is increasingly

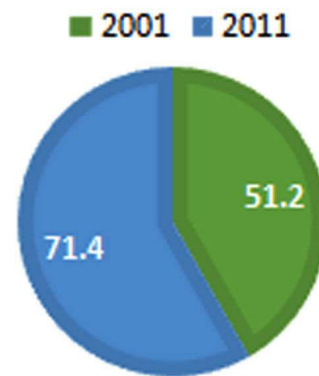
attributed to voluntary decisions, especially among women with higher education. This reflects a broader transformation in societal norms and individual priorities. Couples are opting for a child-free life due to personal and professional reasons. The decision is influenced by factors such as career goals, lifestyle choices, and the desire for personal freedom. A study by ASSOCHAM revealed that child-free couples tend to spend more on lifestyle needs than couples with children (Pandey S., 2019). The choice not to have children is personal, but couples often face societal pressure. Environmental concerns and the desire to reduce carbon footprint are among the reasons for not having children. The social narrative still treats the decision to remain child-free as unconventional (Majumdar, 2021). On the other hand, Infertility affects a significant number of couples in India, with 27.5 million couples wanting to conceive but suffering from infertility. This data suggests that while some couples choose not to have children, others face challenges in conceiving, contributing to the decline in fertility rate (Sharma, 2018).

Single and Unmarried status

India is home to 71.4 million single women which includes never married, divorced and widowed women according to the 2011 Census a number larger than the entire populations of Britain or France (Pandey G., 2022).

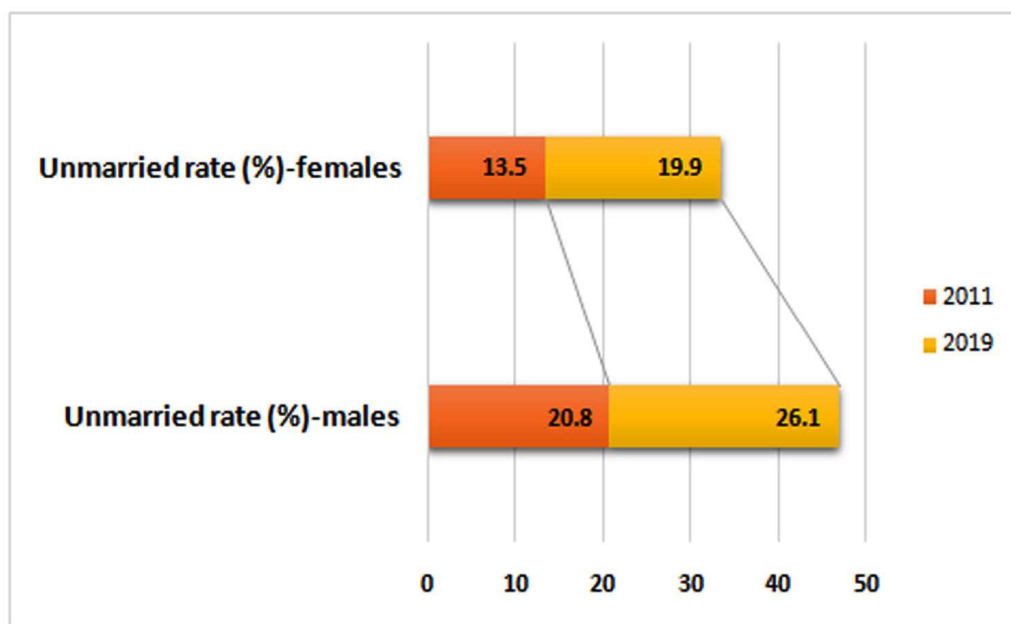
The growth in the single women population suggests changing societal norms regarding marriage. The increase of over 20 million individuals in a decade (**Graph 6**) (The Census of India, The Census of India, 2001) (The Census of India, The Census of India, 2011) be influenced by factors such as higher education levels, career

POPULATION (IN MILLIONS)



Graph 6: Population of single women (unmarried, divorced and widowed) in millions (*Source:* Census of India 2001 and 2011)

prioritization, and changing attitudes towards traditional family structures. With more people remaining unmarried, there could be a direct impact on fertility rates.



Graph 7: Gender-wise unmarried rates % (*Source:* The Economic Times, Proportion of unmarried youth rising, finds govt survey, 2022)

Graph 7 labels the increase in the unmarried rates among both genders which suggests a shift in cultural norms. In 2011, 20.8% of males and 13.5% of females were unmarried, which increased to 26.1% and 19.9%, respectively, by 2019. This indicates a societal trend towards delaying marriage or choosing not to marry. Delayed marriages and a rise in the unmarried population directly impact fertility rates. With more individuals remaining single for longer, the average age of first-time parents increases, contributing to a decline in the Total Fertility Rate (TFR) (The Economic Times, Proportion of unmarried youth rising, finds govt survey, 2022).

Shift in Family type

The diminishing fertility rate has significant repercussions on society, affecting the dynamics of marriage and family structures. With fewer couples choosing to tie the knot, the institution of marriage faces a notable impact. Consequently, the prevalence of nuclear families is on the rise, as couples opt for smaller family units or remain childless. Concurrently, the escalation in divorce rates further complicates familial dynamics, leading to more fragmented households and reshaping traditional notions of family life. India is witnessing a surge in the number of nuclear families. According to Kantar data, at the all-India level, 50% of the 318 million households were nuclear in 2022, up from 37% of households in 2008 (Ambwani, 2023).

Increase in Cesarean deliveries

Mothers who opt for caesarean sections often choose to have a single baby to prevent future medical complications and avoid the pain they experienced from caesarean delivery. According to a study published in 2023, the prevalence of C-sections in India rose from 17.2% in 2016 to 21.5% in 2021 (Mohan, Shirisha, Vaidyanathan, & Muraleedharan, 2023). It's important to note that while caesarean sections can be life-saving, they also carry risks and should be performed based on medical necessity (WHO, 2021). The World Health Organization suggests that the ideal rate for caesarean sections should be between 10% to 15% (Matta, 2019). The rising prevalence of caesarean sections in India is becoming a point of worry. Factors such as improved education levels, higher income, and strong support from partners are believed to influence this trend. It's essential to establish effective surveillance systems to evaluate the justification for caesarean sections, particularly those that are not medically necessary (Pandey &

et al, 2023).

Semen Quality

The decrease in fertility rates is influenced by various environmental and lifestyle factors, impacting human semen quality. This widespread issue of poor semen quality contributes significantly to male infertility, a prevalent condition affecting numerous individuals (Agarwal & *et al*, 2015) (Aitken R., 2020a) and lifestyle factors, resulting in a stark reduction in sperm counts over the past five decades across both Western and Eastern regions, including China (Levine & *et al*, 2017)(Lv & *et al*, 2021) (Swan & Colino, 2021). The exposure to estrogens, whether internally or externally, underscores the intricate interplay between lifestyle choices and hormonal balance. A linear correlation analysis reveals a notable relationship between a country's GDP and the incidence of testicular cancer, indicating that higher GDP levels are associated with increased rates of this specific cancer type (Aitken, 2022). As the incidence of testicular cancer rises, there is a simultaneous decrease observed in the total fertility rate (TFR), suggesting a potential inverse relationship between these two phenomena (Aitken, 2022).

Concerns have been raised about the decreasing semen quality among men in India, as research suggests a consistent decline over recent years. An extensive analysis covering a period from 1979 to 2016 revealed significant reductions in both sperm count and normal sperm shape, particularly among men facing infertility challenges (Mishra & *et al*, 2018) The reasons behind this trend are multifaceted, encompassing environmental factors, lifestyle habits, and broader socio-economic factors. To combat this issue, it's essential to implement public health strategies and raise awareness to improve men's reproductive well-being (Varma, 2023).

Gender Preference

The persistent preference for sons continues to influence fertility choices, often leading to imbalanced sex ratios. Enforcing restrictions on family size can exacerbate gender discrimination and further skew the sex ratio against girls, perpetuating societal challenges related to gender equality and female empowerment (UNFPA, 2023).

Other Factors

The diminishing fertility rates among men and women stem from various lifestyle choices, encompassing dietary habits, smoking, alcohol

intake, and exposure to industrial pollutants and electromagnetic radiation. These factors, coupled with stress and sedentary lifestyles, contribute to the onset of oxidative stress within the reproductive system, potentially impairing fertility (Aitken and backer 2013, 2020, Aitken, 2020 a, b).

Consequences and Implication

By 2000, Korea's birth rates fell to 1.4, driving economic growth and a younger workforce. However, projections for 2040 anticipate a surge in the elderly population, paralleling global challenges with aging societies (Cleland, 2008). By 1980, fertility rates in most countries fell below the replacement level of two births per woman, indicating a global shift towards aging populations and underscoring challenges in sustaining growth and socio-economic stability (Cleland, 2008). In 2010, there was a notable decrease in the average births per woman, reaching 1.5, observed across various regions such as Italy, Spain, Germany, Austria, Russia, Eastern Europe, Japan, Hong Kong, Singapore, Taiwan, and South Korea. Under China's one-child policy, TFR dropped rapidly from 2.29 in 1990 to 1.18 in 2010 and further to 1.05 in 2015 (Quanbao-Jiang & Sánchez-Barricarte, 2022). Despite the implementation of the universal three-child policy in 2021, it remains plausible that fertility will continue to decrease (Lan & Kuang, 2021). Japan has experienced a substantial decline in its Total Fertility Rate (TFR), which hit a historic low of 1.26 in 2005. The implications of this decline

are twofold: an aging population and the potential decrease of 11 million people over the course of a decade (Kurashima & Asahi, 2022).

Population projections for India and its states from 2011 to 2036 utilize the cohort component method, which is crucial for forecasting demographic trends based on factors such as fertility, mortality, and migration. Over this period, India's population is anticipated to surge from 121.1 crore to 152.2 crore, marking a 25.7% increase or approximately 1% annually. Declines in crude birth rates, notably from 20.1 to 13.1 between 2011 and 2035, coincide with falling total fertility rates (TFRs), leading to decreased infant mortality rates from 46 in 2010 to 30 in 2035 (The Census of India, 2020). While the proportion of the population under 15 years is projected to decline from 30.9% to 20.1% by 2036, the elderly population is set to rise significantly, with older persons increasing from 8.4% in 2011 to 4.9% in 2036 due to improved life expectancy. Consequences of declining fertility include a reduced school-going population from 25.4 crore to 20.9 crore and a decline in the youth population from 23.3 crore in 2011 to 22.9 crore in 2036 (The Census of India, 2020). Moreover, the sex ratio is anticipated to improve from 943 females per 1000 males in 2011 to 952 in 2036. With the TFR expected to decrease from 2.37 to 1.73 and urbanization on the rise from 31.8% to 38.2%. Major states had already achieved a TFR of 2.1 by the period of 2000-2010 (The Census of India, 2020).

Furthermore, Kerala demonstrates lower

Table 3: Positive and negative impact of declining TFR in India

Impact type	Positive impact	Negative impact
Economic	Potential for economic growth through a more manageable population size	Potential labour shortages impacting economic progress
Social	Better health and education outcomes with more resources per child	Changes in traditional family structures and intergenerational support systems
Environmental	Eased pressure on natural resources leading to sustainable environmental management	-
Health care	-	Strain on healthcare systems due to an aging population.
Gender equality	Increased educational and career opportunities for women leading to greater gender equality	-
Urbanisation	Urban development due to migration from rural areas seeking better opportunities	Overcrowding and strain on urban infrastructure
Cultural	Shift towards more nuclear families may lead to increased individualism	Potential loss of cultural practices tied to larger family units
Political	Potential for more focused governance due to a smaller population	Challenges in policy-making to support an aging population

fertility and mortality rates, with one in every five individuals projected to be a senior citizen by 2036. Notably, the infant mortality rate is also expected to decrease during this period. These projections highlight the complex interplay of demographic factors shaping India's future population dynamics (The Census of India, 2020).

Policy responses and interventions

Various policies have been implemented globally to address declining Total Fertility Rates (TFR) in other nations across the globe. In Sweden, maternity and paternity allowances encourage parental leave and childcare support. France offers child allowances that scale with parity, incentivizing larger families. Australia and Italy provide cash payments at birth to alleviate financial burdens associated with childcare. Additionally, infant care centers offer accessible and affordable childcare options, aiming to ease the challenges of balancing work and parenthood for families. These initiatives reflect concerted efforts to support and encourage higher fertility rates through targeted policy interventions (Cleland, 2008). Policies, support mechanisms, and societal attitudes play crucial roles in addressing the decline in fertility rates influenced by socio-economic and educational factors. Policies, support, and attitudes can mitigate declines in fertility driven by socio-economic and educational factors. However, the lasting impact of a combination of environmental, lifestyle, and genetic factors poses challenges beyond immediate solutions. Developed nations implementing liberal migration policies can address depopulation challenges more effectively. Scandinavian countries have implemented parental support schemes aimed at increasing Total Fertility Rate (TFR) while addressing tensions between professional development, economic stability, and motherhood, offering a model for balancing work and family life (Aitken, 2022).

China replaced its one-child policy with a universal two-child policy in 2016, allowing couples to have two children. However, despite this change, the **Total Fertility Rate (TFR)** remains low, and the population continues to age rapidly. The government has introduced measures to support families, including extended parental leave, childcare subsidies, and tax incentives for families with multiple children. Efforts are being made to encourage early marriage and childbearing through awareness campaigns and social programs (Quanbao-Jiang & Sánchez-Barricarte, 2022). *Japan* has implemented policies to improve work-

life balance, support families, and encourage childbearing. These include flexible working hours, expanded childcare facilities, financial incentives, and matchmaking services. To address the issue of significant increase in the ratio of elderly to working-age population, the *Korean government* implemented policy plans to support child-rearing, but the resulting increases in fertility rates were slight and inconsistent (Ha Park, 2020). South Korea has implemented pro-natalist policies, including cash incentives for childbirth, subsidized childcare, and extended parental leave. Efforts to promote gender equality and women's participation in the workforce play a crucial role in encouraging family planning. Additionally, public awareness campaigns emphasize the benefits of having children. Policies also aim to support working parents and address the high cost of education. Comparing South Korea's policy responses to those of Japan, it becomes evident that Japan's targeted and broad based policies have successfully reversed the declining fertility trend. Recommendations include engaging multiple stakeholders and addressing factors related to education, culture, and economics (Ha Park, 2020). *Singapore* government provides financial incentives through the Baby Bonus Scheme to encourage couples to have more children. Additionally, it offers affordable housing and childcare support. Policies in *Taiwan* include parental leave, childcare subsidies, and efforts to reduce the gender pay gap. The government strives to create a family-friendly environment. The *Vietnamese* government emphasizes family planning education, maternal healthcare, and access to contraceptives. It encourages delayed marriage and childbearing.

Despite India's distinction as one of the most populous countries globally, it has not yet implemented policies to address the declining Total Fertility Rate (TFR). To reverse this trend to boost TFR, a multifaceted approach is essential. Policy interventions could include comprehensive reproductive health services, enhanced maternal healthcare, and incentives for families that align with the desired demographic outcomes. India should extend the six-month paid maternity leave to twelve months for the working women in both government and private sector among whom the fertility rate is low. India stands at a crossroads, where thoughtful population policies can shape our collective future. A nationwide **Two-Child Policy**, tailored for states with Total Fertility Rates (TFR) nearing 2.0 or more, would encourage responsible family planning. Simultaneously, states with TFR rates

below 1.0 deserve a **Three-Child Policy**, fostering sustainable growth. Navigating this delicate path toward a harmonious tomorrow, the nation should strive to address the challenges of aging, labour, and potential birth crises.

Additionally, educational campaigns to shift societal norms towards larger families, coupled with economic support for parents, to reduce caesarean deliveries, lowering migration rates by creating jobs for the younger population, lifestyle and behavioural changes etc can create a conducive environment for raising TFR in India. It is also crucial to target specific regions with lower than average TFR by tailoring interventions to local cultural and socio-economic contexts. By integrating these strategies within a robust policy framework, India can effectively navigate the demographic challenges ahead and foster a balanced population growth.

CONCLUSION

In conclusion, the decline in India's Total Fertility Rate (TFR) is a multifaceted phenomenon influenced by cultural, economic, and social factors. If the current trend of fertility decline continues in India, the future may see a significant demographic shift. Recent study projects India's fertility rate to fall to 1.29 children per woman by 2050 which results in birth crisis in India (Bussiness Standard, 2024) (NDTV, 2024). Urbanization, education, and access to family planning have been pivotal in this demographic transition. Moreover, changing societal norms, particularly regarding the role of women in society and the workforce, have contributed to the declining TFR. The intersection of culture and fertility is evident in the varying TFRs among different religious communities, with Muslims experiencing a dramatic decrease from 4.4 children per woman in 1992 to 2.6 in 2015, yet still having the highest TFR among India's major religious groups. The implications of this decline are profound, affecting economic growth, labour markets, aging problems and the dependency ratio. As India navigates this demographic shift, policies must adapt to support a sustainable future, balancing the needs of a changing population with the preservation of cultural values and practices. Boosting Total Fertility Rate (TFR) in a densely populated country like India is indeed a formidable challenge but very much essential to address the issue of declining TFR for the survival of future human population. The ongoing decline in TFR across India is not just a statistical trend but

a narrative of a nation's evolution in the face of modernity and tradition.

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