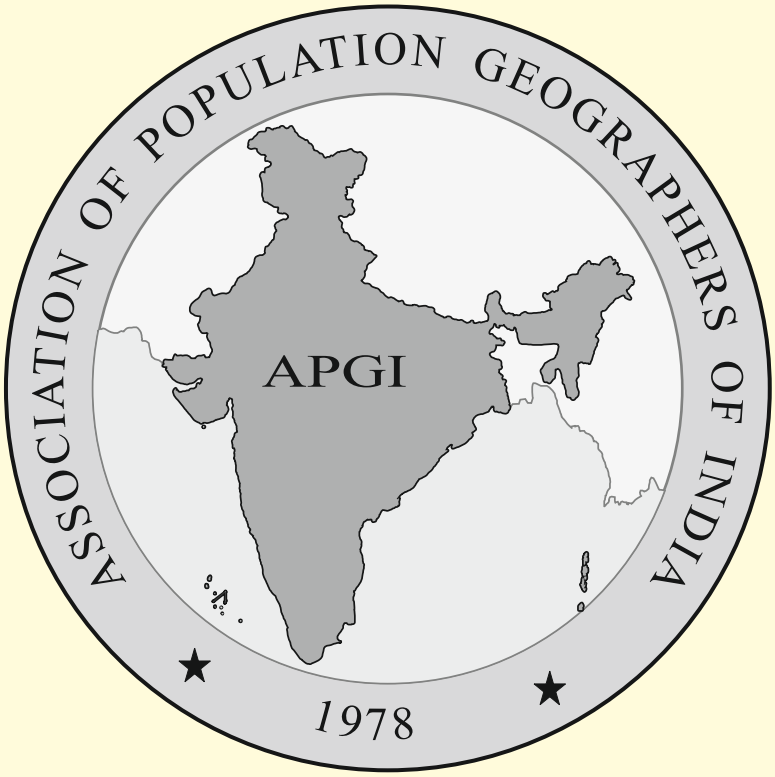
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From the Editor's Desk

Navigating the Complex Tapestry of Socioeconomic Challenges in India

As we navigate a pivotal moment in addressing the intricate challenges facing contemporary India, it's crucial to delve into the elements that weave together its societal tapestry. The evolving urban landscapes, intertwined with issues such as gender inequality and health disparities, call for a dynamic and thoughtful dialogue.

Take, for instance, Darjeeling's shifting waterscapes—where common resources are becoming commodities. This scenario emphasises the immediate need for sustainable practices that honour both the environment and local communities, striving to harmonise economic growth with ecological responsibility.

In the realms of education and internal migration, the profound link between mobility and opportunity becomes clear. Education is a vital instrument for personal advancement, yet significant barriers prevent many from realising their potential. We must prioritise addressing these disparities to cultivate a fairer society for all.

The alarming decline in the child sex ratio in Punjab raises urgent public health concerns and demands comprehensive strategies to bridge rural-urban inequalities. By understanding the root causes, we can develop effective interventions to safeguard future generations.

Moreover, the Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) represents both the promise and the hurdles of generating employment in rural regions. Insights gained from case studies in Fatehabad District shed light on the success of these initiatives for marginalised communities.

While we've made strides in women's empowerment, significant barriers remain in Bihar, revealing deep-seated injustices that obstruct genuine gender equality. Similar challenges affect fertility-related decision-making autonomy among Muslim women in the Indian Sundarbans.

An in-depth examination of infant mortality rates in Jharkhand highlights the urgent need for adaptive healthcare systems that can deliver targeted interventions to reduce them.

Investigating the trends of an ageing population and chronic illnesses within the demographic framework of India.

Finally, the occupational landscape in Alwar District, Rajasthan, reflects broader economic trends across India. Understanding the local labour market is essential to devising policies that enhance employment prospects.

Confronting these issues requires a collaborative effort among policymakers, researchers, and community leaders. By fostering open dialogue and exchanging insights, we can craft comprehensive strategies to reduce socio-economic disparities and move towards a more equitable and inclusive society. Together, we can turn challenges into opportunities for transformation.

Nina Singh

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Commons to Commodity: Changing Waterscapes of Darjeeling City

Kaberi Koner and [1]Gopa Samanta

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Abstract
An increasing trend of treating water as a commodity rather than a common resource is observed worldwide. This shift is closely linked to the space-specific politico-economic conditions. Water management and supply by public or private authority often seems like a threat to the concept of 'water as a right'. In Darjeeling (a colonial hill city of eastern India), the British regime developed twin lakes to supply public water, but they had limited capacity and were mainly for elites. Later on, population growth and the consequent development have damaged the natural environment. Innumerable springs in and around the city have dried up, severely impacting the city's water availability. From the mid-1980s, private water supply started on a small scale in response to scarcity. Now, it has emerged as the only viable option for many, but not for all user groups. Here, the debate is on – whether water can be treated as a commodity or whether it would continue to be a right? Against this backdrop, using the political ecology framework, this empirical study explores how the status of water changed over time and how this change affected city life differently across classes.
***Keywords*:** Water, common resource, commodity, political ecology, Darjeeling

Introduction

With the progress of civilisation and changes in the global political economy, the uses of water became more varied, and its impacts became multi-dimensional. As a consequence, a new debate arose on how to treat water – as a public good or as a consumable commodity? In general, there is a widespread belief among people that water is a natural resource and therefore must be free to use (WSP 2002, 2011). As a natural resource, it was primarily used as a common resource, and community participation was the only system for managing water sources and supply in traditional societies. With the advent of the neo-liberal economy, the pre-existing perception of water has changed worldwide, emerging more as a commodity (Loftus & McDonald, 2001; Bakker, 2003, 2007; Budds & McGranahan, 2003). In 1992, the Dublin conference strongly recommended considering water as an economic good. However, many scholars (Mader, 2011; Salman, 2014; Smith,2009) have opined that it should be treated as a public good rather than an economic product. Another group of scholars, such as Mehta (2003) and Krishnaraj (2011), argue that water should be treated as an impure public good. Krishnaraj (2011), however, believes that treating water as a public good is not the only solution to problems such as unequal distribution and discrimination.

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Presently, in all cities, water is supplied as a public good by the responsible authorities, such as Urban Local Bodies (ULBs), Public Health Engineering (PHE), river basin authority, water supply board, and so on (Ahmed & Zwarteveen, 2012; Iyer, 2003; Kumar, 2014). This is also practised in Indian cities, but in most cases, public water is highly subsidised in India (Zerah, 2000). ULBs are trying to reform their water pricing and tariff structure accordingly (WSP, 2002, 2011). The rationality of water pricing, or appropriate user charges, cannot be ignored to stop water misuse and provide reliable services to end users (Bajpai & Bhandari, 2001; Ganguli, 2013). However, in most cases, existing practices result in distortion and undesirable effects, mainly for poor users. Considering these matters, recent debates focus more on issues related to water governance, that is, whether it would be public or private property, or how the resource would be managed carefully to be allocated equally within society. In all systems, whether it is treated as a common, public, or private resource, several structural and legal advantages and disadvantages exist. Thus, the discussion must be contextual and space-specific, considering the past and present trajectories of development and the socio-cultural practices of users in a particular place, following Swyngedouw et al. (2002, p. 3), who noted, "Produced environments are specific historical results of socio-environmental processes".

In Darjeeling city, water management practices have changed over time and have ultimately been converted into a commodity. The entire water scenario has changed primarily due to acute scarcity, though the scarcity here is not natural. Several socio-political factors have transformed the natural flow of water into a complex system of unequal power dynamics, making the city's waterscape unsustainable and multidimensional. It represents a unique complex of forces, including inefficient water governance and local politics. Environmental degradation, leading to increasing water scarcity, is also the result of violent political movements and the growing commercialisation of the city. Narrow political and financial interests of some politically powerful people have made the situation worse. To portray the entire scenario logically, the article starts by presenting the main arguments from relevant perspectives, then explains the city's changing waterscapes, followed by the present condition of the water market and its impact on different user groups. Finally, it raises the debate on water as a right versus water as a commodity. It concludes by arguing that basic water requirements must be recognised as a right to promote water justice.

Methods

This empirical study critically assesses the changing waterscapes of the city over a long period of time using the lens of political ecology (PE). An asymmetric power equation, influence of the upper and middle-class on the local administration, private water market without any governmental control or intervention, substantial gap between demand and public supply, and link of demand and affordability of the users at the household level—all these field observations have encouraged us to analyse the nature of water crisis through the lens of PE. Bakker (2003) has pointed out that PE enables in-depth analysis of 'winners' and 'losers' of privatisation; emphasises social and environmental justice; and evaluates the role of the state in resource allocation and redistribution. Moreover, to construct critical dialogue on the relationship between centralised formal water infrastructure and locally developed decentralised alternatives, analysis using the PE framework seems more accurate. Moreover, to explore the power equation,

illegality, and political nexus within the entire water system, various target groups from different classes of society have been selected. These are: 350 households (175 from slum and 175 from non-slum), 20 elderly people, water vendors (20 tanker drivers; 8 pull-cart owners; 4 water hawkers; 2 water grocers), 12 municipal officials and councillors, etc. Following ethnographic methods, information was gathered through formal and informal conversations, including questionnaire surveys, participant observation, oral history, narrative analysis, focus group discussions, etc., using purposive and snowball sampling techniques. Qualitative methods were primarily used to interview elderly people, elected representatives, and municipal officials.

City's Waterscapes: A Journey from Common Resource to Commodity

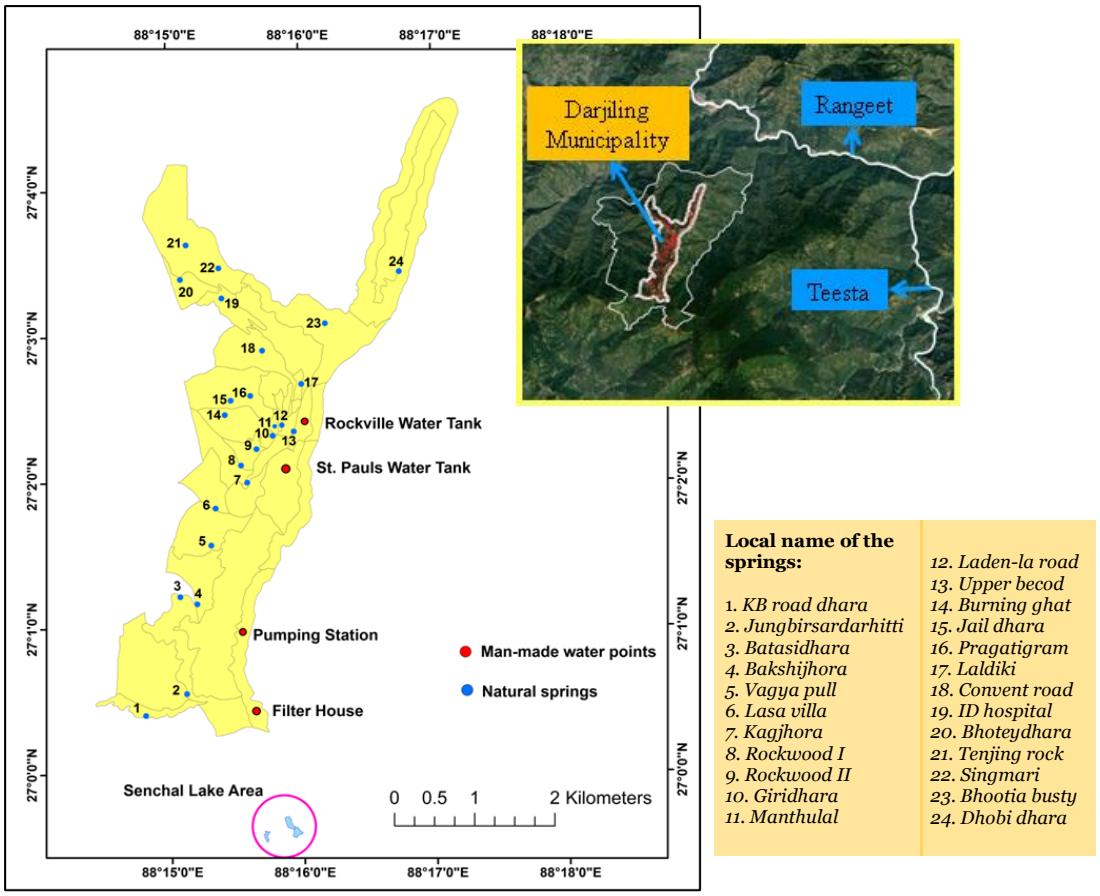
Each city has its own specific physical and socio-cultural setup. The economy and politics of that particular urban space, along with its physical and socio-cultural specificities, make the system uniquely complex. Whereas the availability of potable water is strongly dependent on the physical set-up, access to water is more closely linked to socio-cultural and political-economic forces. Therefore, in addressing water issues, all these conditions need to be addressed at the citywide level by the city government. Darjeeling, with its mountainous physiographic structure, has no direct access to groundwater, and no such big rivers flow near the city. Darjeeling experiences high rainfall (around 3100 mm per annum). However, the city continues to face an acute water crisis that is especially severe in the summer season (Planning Commission of India, 2008). Darjeeling city is primarily dependent on the spring water (Figure 1). Many of those springs have already dried up, and many others are in a deteriorating phase of discharge, thus reducing the supply of potable water (Koner & Samanta, 2021a). Increasing uncertainty of water impacts unfavourably the lives of people residing in the city. Almost all Himalayan cities are facing a similar environmental crisis, as reported by NITI Aayog (2018).

For analysing the changing waterscapes of the city, the entire period of city government (1850, the year of establishment of the municipality) is divided into three phases: a) before 1932, b) 1932 to 1986, and c) after 1986. Before 1932, water was absolutely free, and sources were diverse, and no organised supply-management practices existed. It was used and managed as a common resource only by the local communities. After the twin lakes were initiated in 1932, organised water supply management was implemented through the ULB, while local communities also used spring water. After 1986, private water supply emerged as the only viable alternative to all previously practised systems. The next subsections analyse all three phases of changing waterscapes.

Water as a Common Resource (before 1932)

Darjeeling was quite a water-efficient city, as population pressure (both permanent and transitory) was less. Before the advent of the British, the area was inhabited by indigenous peoples (Campbell, 1868; Dash, 1947). Thereafter, with the escalating development work, people began migrating to this area from the surrounding hill regions as construction labourers.

Figure 1
The City and its Water Points



Local name of the springs:

1. *KB road dhara*
2. *Jungbirsardarhitti*
3. *Batasidhara*
4. *Bakshijhora*
5. *Vagya pull*
6. *Lasa villa*
7. *Kagjhora*
8. *Rockwood I*
9. *Rockwood II*
10. *Giridhara*
11. *Manthulal*
12. *Laden-la road*
13. *Upper becod*
14. *Burning ghat*
15. *Jail dhara*
16. *Pragatigram*
17. *Laldiki*
18. *Convent road*
19. *ID hospital*
20. *Bhoteydhara*
21. *Tenjing rock*
22. *Singmari*
23. *Bhootia busty*
24. *Dhobi dhara*

The city was less commercialised than it is at present. It was endowed with innumerable perennial springs (locally called Dhara or Jhora) in and around the city, and these were sufficient to meet the city's total water requirement at that time. People used to collect water from those springs. Mountain springs are considered a Common Property Resource (CPR). According to NSSO (1999, p. 1), "CPRs include all resources like village pastures and grazing grounds, village forest and woodlots, protected and unclassed government forests, waste land, common threshing grounds, watershed drainage, ponds and tanks, rivers, rivulets, water reservoirs, canals and irrigation channels". CPRs are important bases of the economy, society, and environment, and they have the potential to support the poor and marginal. Managing CPRs is vital for safeguarding natural resources and ecological balance (Saini et al., 2009). No individual can enjoy exclusive property rights under CPRs; i.e., everyone has equal rights (Karanth, 1992; Ostrom & Hess, 2000; Jodha, 1986).

Until the early 1930s, the city's water practices were simple and traditional, and the system was managed solely by local communities (Koner & Samanta, 2021b). As Jha (2010) noted, prior to the colonial period, local communities primarily managed India's water provision, which was certainly based on their indigenous knowledge. During that period, water demand was limited and natural supply was

abundant. People did not have to face difficulties in getting spring water in terms of time and money. To this day, the majority of residents use spring water, but they face several difficulties in doing so. The emergence of Darjeeling as a hill city and British sanatorium has changed the city's entire water scenario, i.e., both the water management and water culture.

Water as a Public Good (1932 to 1986)

The city's growth is rooted in colonial history, and the establishment of its centralised water infrastructure was a model of the British developmental strategies in Indian cities. The British government built the twin lakes (Senchal North and South) mainly for British elites; they were completed in 1910 and 1932, respectively. Since then, water management practices have shifted from community management to public management. This change resulted from the colonial legacy, which all colonial cities in India experienced. These practices resulted in the degradation of indigenous water sources and the destruction of traditional water management practices (Koner & Samanta, 2021b). To date, the centralised water supply system is fully monitored by the Darjeeling municipality's waterworks department.

The water storage capacities of these reservoirs were 20 million gallons (MG) and 12.5 MG, respectively, intended to serve only the then-population of about 10,000 to 40,000 people. Now, the city has a population of over 1,20,000, all of whom rely on the same water source. The present water deficit is 13,32,500 gallons per day (Darjeeling Municipality, 2012). Moreover, it is estimated that around 2,00,000 people constitute the city's floating population, who stay there on a part-time basis (Drew & Rai, 2018). These people put pressure on the city's water infrastructure but are not considered users when estimating water demand. In this situation, people get water once every 5–7 days during the rainy season, and once every 10–15 days during the dry season (Samanta & Koner, 2016). Here, basic supplies are not ensured for citizens. Thus, the water crisis primarily reflects the city's limited capacity to serve a limited population.

Moreover, supply lines do not reach all areas; around 10% of households have an in-house municipal water connection (Darjeeling Municipality, 2012). Spatial inequality exists within the city in both the frequency and duration of water supply. This happens because of the differential power position of the ward councillors of the municipality. A large number of households cannot even afford the initial installation cost of an in-house municipal connection, which is now Rs. 55-65 thousand, depending on the location.

Municipal water is not free at all; it costs Rs. 500 and Rs. 2000 per connection annually for domestic and commercial purposes, respectively. However, only 0.39% of total water revenue was collected in the 2016–17 financial year (Darjeeling Municipality, 2018), indicating a weak financial base and high inefficiency within the municipal authority (Koner & Samanta, 2021c). Several institutions (WaterAid, 2011; WSP, 2011; EEA, 2013) opined that water pricing must be based on the principle of full cost recovery, which includes operational, capital, and environmental costs. They believe that the sustainability of the resource depends largely on a good tariff structure.

During the household-level survey, local people complained about illegal connections, illegal supply, and illegal water tapping in the city. People think that these illegal water flows are the main reason for water scarcity in the city, which they have to negotiate daily (Koner & Samanta, 2021c).

They also opined that water is one of the most important political issues for all political parties in Darjeeling. In these circumstances, when the majority of people do not receive adequate services from the accountable authority, the chances of illegal connections, illegal tapping, and illegal supply increase, and these are real facts in the context of Darjeeling city. Radonic and Kelly-Richards (2015) have recognised illegal connections and supply as the consequences of unequal distribution and misuse of power. Regarding illegal tapping, they state that it indicates a failure of governance that excludes all from the service network. It clearly shows the material inequality created by the formal hydraulic system. Therefore, the city's water authority must have sufficient control over the entire service-provision system to ensure basic water supply for all, irrespective of class, which in turn will create a platform for transparent water governance.

Water as a Commodity (after 1986)

The severe water shortage, the financial and structural limitations of the public supply, and weak water governance create opportunities for the water market in the city. The private water supply system began in 1986, as reported by all the elderly interviewees and municipal officials. Earlier, when demand was lower, small-scale unorganised water trading was practised by water hawkers (the oldest mode of private supply in the city) and pull-carts. Over time, with the rising demand, modes of water transport have shifted from these water hawkers and pull-carts to water tankers (Plate 1). Very recently, water groceries have entered the water market as a new system for selling water, but it is mainly limited to a few informal settlement areas. However, the demand and customer base of all these systems are comparatively smaller than that of water pull-carts and water tankers.

Private water supply in Darjeeling has become the only viable alternative to the current water crisis. It is likely to flourish in future as well, in both the domestic and commercial sectors. However, the future water market will most likely be controlled completely by water tankers. Here, political intervention is most crucial for transforming water from a free natural resource into a commodity, and increasing dependence on tankers. Although the turnover of individual businesses is small, local people call these leaders-cum-businessmen 'water mafia' (Samanta & Koner, 2016). Bakker (2003, p. 55) claimed that "water privatisation reconfigures the relationships between the state, the market, our water environments, and one another". Within these circumstances, poor and marginalised people have to struggle more to cope with water scarcity. The next section will analyse the city's growing water market, its nexus with local politics and the city administration, and its differential impacts across social classes.

City's Flourishing Water Market

The scale of business has changed in recent years, in line with the city's water demand. Presently, around 80 water tankers operate in the city from 7 pm to 7 am officially, and each tanker contains 6,000 litres of water. Before 2012, there were around 56 pull-carts in the city, but now the number has decreased to only 25. Water pull-carts carry smaller amounts of water (a maximum of 240 litres at a time) compared to tankers. Both the supply systems, pull-carts and tankers, have their own customer base and area of influence within the city. Water pull-carts primarily serve small shops and restaurants, as well as households with limited financial means and small water storage capacity, i.e., mainly poor and marginal households. The system's area of

influence is mainly in areas where water tankers cannot reach, either due to steep slopes or narrow roads. In the case of tankers, they primarily supply large hotels, guest houses, cafeterias, and restaurants; households with sufficient financial means and higher water storage capacity; newly built residential apartments; and the construction sector, due to greater demand. The area of influence of tanker supply is confined to and around the main city area, where tankers can easily reach. Undoubtedly, all the major commercial establishments and the well-off houses are located along or near the main roads. Therefore, the customer base for water tankers is much stronger than that for water pull-carts. Though both systems have their own business areas and fixed customer bases, water pull-carts are losing significance and demand compared to water tankers.

Figure 2

Water Purchasing Pattern from Varied Modes of Supply by the Different User Groups

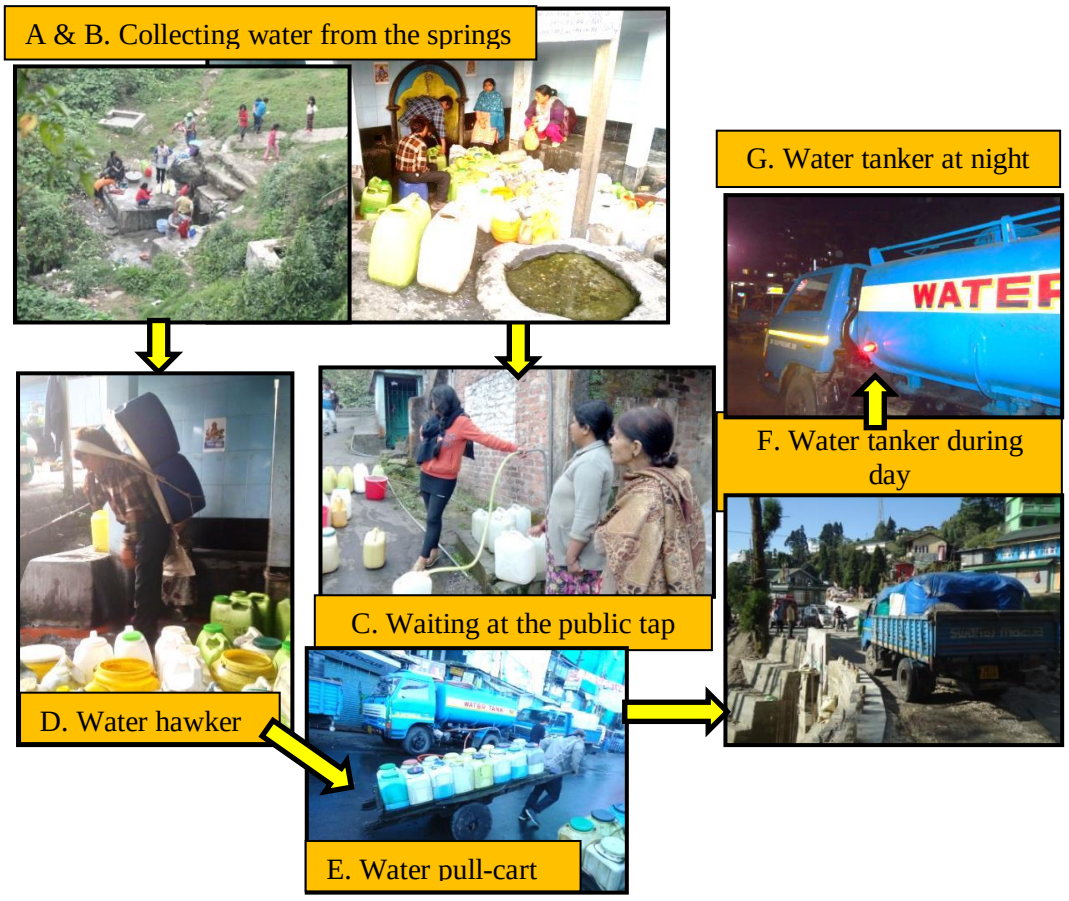
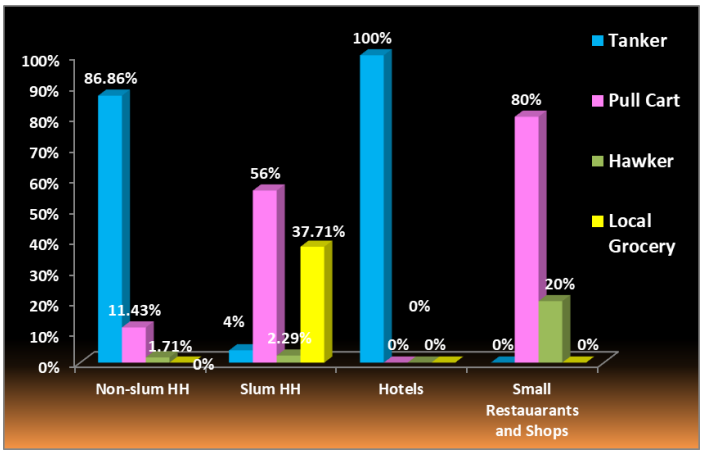


Plate 1

Visualisation of Changing Waterscapes of the City



Affordability Matters!

During the six months of the dry season (mid-December to mid-June), four months (March to June, before monsoon) are considered the peak tourist season. During that time, water demand exceeds supply, and the crisis peaks, raising water prices as well. During these dry months, almost all households have to buy water, which feels like a compulsion, but the cost is unaffordable across all income groups, as observed in the field. The cost of tanker water varies from Rs. 1200 to Rs. 2000 per 6000 litres, depending on seasonal variations in water availability and fluctuating demand. Table 1 explores whether the cost of water is affordable or not for all user groups.

Table 1

Percentage Share for Buying Water from the Water Tankers

Income Range in Indian Rupees	Price of water per 6000 lt. of water			
	Rs.1200	Rs.1500	Rs.1800	Rs.2000
< 5000	> 24%	> 30%	> 36%	40%
5000 – 10,000	24 to 12%	30 to 15%	36 to 18%	40 to 20%
10,000 – 15,000	12 to 8%	15 to 10%	18 to 12%	20 to 13.33%
15,000 – 20,000	8 to 6%	10 to 7.5%	12 to 9%	13.33 to 10%
20,000 – 25,000	6 to 4.8%	7.5 to 6%	9 to 7.2%	10 to 8%
25,000 – 30, 000	4.8 to 4%	6 to 5%	7.2 to 6%	8 to 6.67%
> 30,000	< 4%	< 5%	< 6%	< 6.67%

The above estimate shows that purchasing water daily is unaffordable for all user groups, as the share of expenditure increases with lower household income. According to the WHO's recommendation (2003), only 3% to 5% of an individual's income can be used for purchasing water. However, in Darjeeling, it is much higher than the recommended standard. For low-income households, the cost of water is much higher, even at the minimum rate (Rs. 1,200 per 6,000 litres). The cost of tanker water is only affordable for households having a monthly income of Rs. 35,000 or more. Thus, the data (Table 1) indicate that the majority of households (78% of those

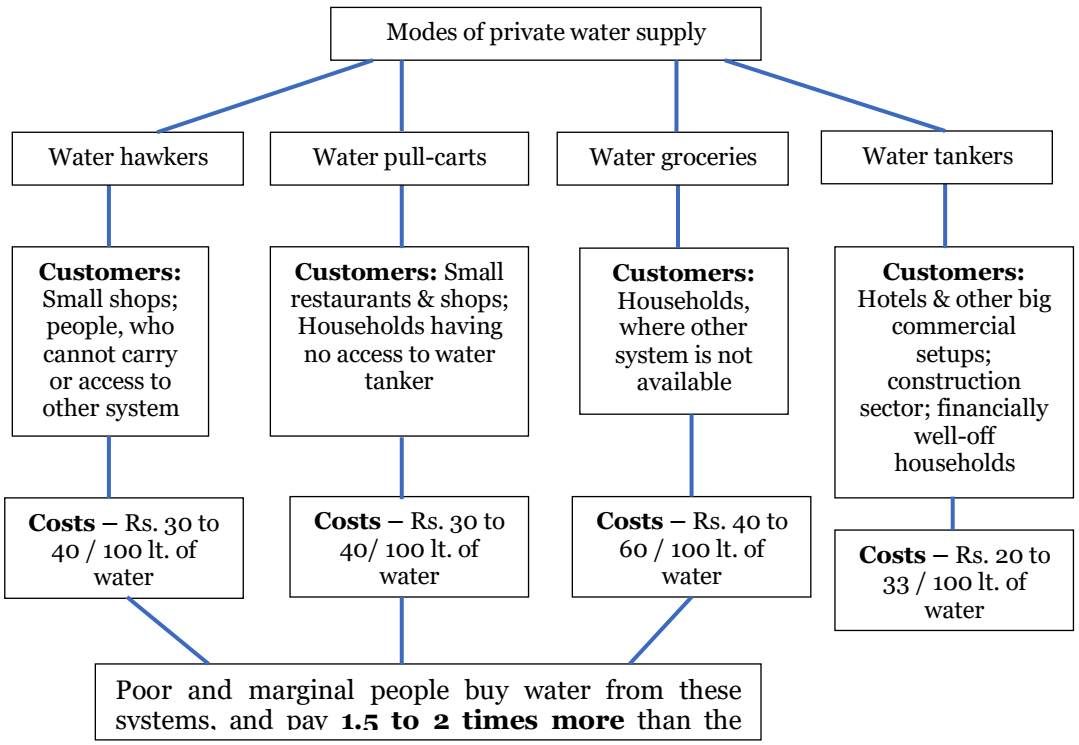
surveyed) have to pay a large share of their income when buying tanker water.

Moreover, the cost of water varies among different modes of supply. Considering all modes of water transport (water hawkers, pull-carts, tankers, and groceries), the price of private water varies from Rs. 30 to Rs. 50 per 100 litres, depending primarily on seasonal variability. The interesting observation is that households that purchase water in bulk from water tankers get water at comparatively lower prices, such as 100 litres of water at Rs. 20 to Rs. 33. On the contrary, the poor and marginal cannot spend a big amount of money at a time to buy water in bulk from the tankers. Thus, they buy water from water pull-carts, local grocery stores, or water vendors, which costs more than what well-off households spend.

Field observation shows that the poor pay 1.5 to 2 times more than the financially affluent classes to get the same amount of water (Figure 3). This is not only the case in Darjeeling; rather, urban poor in almost all Indian cities have to pay disproportionately from their household budget for water (Jha, 2010). Similar observations have been pointed out in some African countries by WUP and WSP (2003). People already on the margins of society have to pay higher prices for water, which pushes them further into marginality and certainly reduces their ability to afford private water supply. Affordability is not easy to measure (Sangameswaram, 2012; WHO and UNICEF, 2017), and it sometimes also determines the level of crisis (Johnston, 2008). Banerjee-Guha (1994) has recognised a common feature in developing countries: a large gap between demand and affordability for basic services. In most cases, people who cannot afford these services remain outside the purview of basic services and infrastructural programmes.

Figure 3

Customer Bases and Costs of Different Modes of Private Supply



Deliberate Policy Initiatives: Pull-carts vs Tankers

The pull-cart system has been losing importance nowadays for several reasons, such as sharply rising demand for water, a growing number of water tankers, lower water-carrying capacity of pull-carts, comparatively higher costs than water tankers, and discouragement by the municipal authority. These factors adversely affect the system. Previously, pull-cart suppliers could collect water from local springs and obtain containers free of charge from many shops, but they cannot do so now. They have to pay for everything, which is not very feasible for them with their limited capital, as stated by Mr N. Biswakarma (a pull-cart owner, continuing business for the last 26 years). For example, if they collect water from the local springs, they have to pay Rs. 20 per day to the *samaj* (the local maintenance authority for the springs), or else they buy water from water tankers (Plate 2) for Rs. 60 to Rs. 100 per 240 litres. Spring water is cheaper than tanker water, although they do not go for that option to save time and avoid problems with local users. That means, per 100 litres of tanker water, they pay Rs. 25 to Rs. 45 based on seasonal price fluctuations. Pull cart suppliers provide water to areas where water tankers cannot reach, and all these factors make the cost of water quite higher in this system.

These pull-cart water suppliers receive no political or administrative support from the local parties and the ULB. Earlier, they could supply water throughout the day. Now, they cannot, as the municipality has fixed their supply time to the early morning, from 3:00 a.m. to 7:00 a.m. Altogether, their business time is only 4 hours per day. This fixed schedule limits their business and keeps their income low. According to the municipal authority, these carts increase traffic congestion and must therefore be stopped or controlled. Mr N. Tamang, a pull-cart owner who has been in the business for the last 22 years, expressed his worries during the conversation and stated that, “We do not know how many years we can continue our business. This is the only means to run our families, and the local authority is not concerned on our income and struggle. Many times, we requested the municipal authority to listen to our problem, but they just ignored it.” The municipal authority no longer wants to continue the pull-cart system in the city, on the pretext that these carts damage the city's roads. Before 2012, all the carts were authorised by the municipal authority through business licences and cart numbers. However, the municipal authority has now cancelled these, as it is not interested in continuing the system in the city. The withdrawal of all support for the petty business of pull-carts indirectly helps water tankers flourish, a trend linked to the complex involvement of various stakeholders and users.

Tanker suppliers do not have to pay any tax to the municipal authority for doing their business. They collect water free of cost from springs outside the municipal area and sell it within the municipal area (Plate 2). These springs are a common resource, which can only be used for human welfare. All individuals in a locality (a well-defined group of users) can access these resources freely, and these resources are out of reach of the market (Hasan, 2002; Regmi, 2011). These common resources cannot be used for business purposes, but this happens in Darjeeling. The tanker suppliers also have no business licences. Regarding the trading time, tankers are officially allowed 12 hours to supply. However, very often water tankers are found on the main road during heavy daytime traffic, which makes it clear that the city administration is not so strict with them, whereas it is very strict with pull-carts. Thus, it is clear that the local administration indirectly helps run the tankers' unauthorised business smoothly.

At this point, the question arises: why has the administration taken a

discriminatory position against small-scale water vending? To explore the possible answer, it is necessary to look into a few other issues, such as who controls the water resource. Who are the customers of the water tankers? Which mode of water supply system serves which group? Political leaders strongly back tanker supply. People involved in the water business, directly or indirectly at various levels, can plug the demand–supply gap and make money from it. Here, a few matters must be considered to understand the city administration's role in the growing market for water tankers. Elites, businesspeople, and political party members are primarily involved at various levels of the private supply system. Therefore, the city government is informally bound to facilitate the system in favour of those groups, because of the political–economic nexus practised in the city.

Who Benefits?

It is clear from the previous estimate (Table 1) that private water supply is the best option for those who can afford it. For them, spending money on water is not a big issue; rather, they do not want to waste their valuable time in a long queue to collect spring water.

Plate 2

Discriminatory Scenario Between Pull-Cart and Tanker



A. Pull-cart owner is buying water from water-tanker *(Chawkbazar; 5:30am)*



B. Tanker suppliers are collecting free water from the springs

Also, collecting water with people from different social classes is something which they dislike and would rather avoid. Mr. Agarwal (age 64, hotel owner) stated, "*we are now very happy with the private supply system of water. Earlier, every now and then, we had to go with buckets at the spring, where long queue was common for few litres of water. We did not want to go there to lose that time, which could be used in a productive job. Besides, people and the ambience around those water collecting points were not good for us. We really wanted to avoid all those water collection process, but there was no option".* This narrative clearly indicates that for financially well-off families, private water supply is more acceptable than free spring water.

Besides, the majority of the hotels are fully dependent on private water supply. Many of them explained that without a private supply system, they could not run their businesses in the city. According to Mr Sharma (hotel manager), they can satisfy tourists' demand only with the timely assistance of private suppliers, and almost all hoteliers agree. Thus, the role of private water suppliers in the city's tourism sector and in recent developmental activities is vital. All newly built residential apartments and the construction sector are entirely dependent on bulk private supply.

Water has such significance in modern urban lives that it can reshape urban space and have a great impact on social relations as well (Gandy, 2004; Kaika, 2005; Loftus, 2009; Loftus & McDonald, 2001; Swyngedouw, 2004a; 2004b; Radonic & Kelly-Richards, 2015). Water gives rise to many kinds of inequalities across different social classes. This can be observed in Darjeeling as well, where both demand and scarcity are relative. These are perceived differently by different user groups and appear in varied forms, which make the city's waterscape even more complex. Therefore, considering all the circumstances mentioned above, a debate is essential on whether water can be considered a public (right) resource or a private (commodity) resource.

Water Dichotomy: Commodity or Public Good?

The trend of treating water as a commodity is almost a global phenomenon, including in urban areas of the Global South. The debate on public vs private ownership is particularly acute in the case of water (Bakker, 2007), but the ownership of common water resources lies between these two: it is neither entirely public nor private. Nobody has exclusive rights to these CPRs. Since no one is in a privileged position to claim ownership, these resources may deteriorate, according to the 'economic rationality' argument (Hasan, 2002). Particularly in the case of CPRs, it leads to misuse or exploitation through privatisation (Karanth, 1992). Expanding demand, scarcity of freshwater resources, and weak governance have posed serious challenges to water resource management (Mohammadpour & Bagheri, 2017). Every system incurs maintenance costs and thus requires charges to recover them (WaterAid, 2011; Bajpai & Bhandari, 2001; Ganguli, 2013). From the viewpoint of water economy, water pricing is perceived as an economic instrument (Kumar, 2014; World Bank, 2007). With the liberalisation of the economy, international development policies have changed, and new concepts such as 'liberal environmentalism', 'green neoliberalism', and 'market environmentalism' have appeared in development discourse. In this regard, Bakker (2007) opined that within these systems of resource regulation, the market has been portrayed as the solution to environmental problems.

In European countries such as France and Spain, there is a tradition of long-term management contracts of municipally owned water supply infrastructure by the private sector. Denmark also practices public-private cooperation in managing water. On the other hand, in countries like Argentina, Bolivia, China, Chile, Indonesia, Morocco, Philippines, Poland, South Africa, Thailand, and Turkey, the state has initiated private-sector participation in the water supply (Bakker, 2003). In the case of Indian cities, to manage the growing demand efficiently, the system of metering and pro-rata pricing of water is being advocated (Kumar, 2014). Proponents of commercialisation define public management as inefficient and unable to extend the network to the poor. However, in reality, only 5% of the world's population is served by formal public utilities (Budds & McGranahan, 2003). It is also argued that private companies, with their efficient management, can lower prices and increase services. However, opponents of privatisation argue that private companies can only seek profits; they cannot ensure equal access to water for people, irrespective of class (Bakker, 2003, 2007; Budds & McGranahan, 2003). Therefore, it is essential to consider the spatial context in this debate, as both systems have some structural merits and demerits.

For example, in the case of Mexico, Radonic and Kelly-Richards (2015) have shown that, due to existing mismanagement in the water system, the government has promoted private investment at the municipal level. To encourage decentralisation and private participation,

Mexico issued a new National Water Law in 1992. They made this change because, in 1917, the Mexican Constitution defined water as a public good. The new water law has introduced a new water culture as described by Radonic and Kelly-Richards. They stated that this newly established market created a new culture of thinking in which water is a paid resource and introduced the idea of responsible consumers. This has altered the relation between water and the state, users and private stakeholders. In South Africa, access to clean water has been recognised as a basic right of the people by the country's constitution since 1996 (Smith, 2000). In the 1990s, Argentina embarked on a privatisation campaign as part of the country's structural reform plan. It achieved significant success in reducing child mortality, especially in the poorest areas, following reforms in the water sector. In some cases in Sub-Saharan Africa and Asia, there are several examples of positive outcomes, including efficient private-sector management and service delivery. In developing and transition countries, a steady growth in population from 6 million to 94 million, served by private companies, was observed from 1990 to 2000 (Kumar, 2014). Kumar has pointed out that successful private participation and control is possible even in poor economies if there is sufficient political will.

The public–private debate is pronounced worldwide. Since the 1990s, the trend of privatisation has increased considerably, although it is mainly concentrated in larger economies (Budds & McGranahan, 2003). For instance, in the case of Buenos Aires, arguments supporting privatisation and treating it as a generator of sufficient capital for service improvements and extensions proved misleading. The poor have suffered in many ways as a result of the privatisation of the water sector (Loftus & McDonald, 2001). Private companies aim to maximise their profit through full cost recovery and thus cannot include all groups of society within the service network (Bakker, 2007).

In the market-regulated water system, an obvious question arises: is the cost affordable for all? Within a hierarchical society, a minimum cost may appear as a maximum burden for most people, as is the case in Darjeeling. Here, a large share of people (96% of the slum households) are indirectly excluded from both in-house municipal and tanker water supply networks because they cannot afford these services. Delgado-Ramos (2015) noted that several negative externalities stem from the unequal purchasing power of the poor. Thus, determining water charges is not a simple task and may create many loopholes that discriminate against users. In the neo-liberal economy, governments tend to have little or no control over markets, which severely impacts people who cannot afford every service. In this regard, Swyngedouw (2005) stated, “Neoliberalisation of water governance has in many cases limited the ability of the urban poor to participate in the management of the water resources they need on a daily basis”.

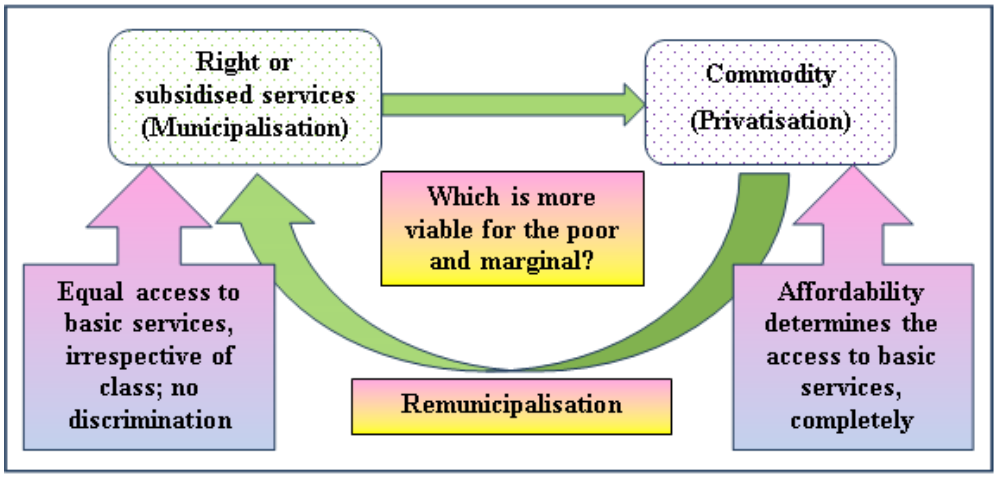
Remunicipalisation: Rethinking Privatisation!

In the context of the neoliberal market economy and the growing debate between the public and the private, remunicipalisation is one of the most significant shifts in water services and policies of the present time, as city governments take back privatised water systems into public control. This is happening worldwide after 30 years of privatisation, including public-private partnerships (McDonald & Swyngedouw, 2019). The process of returning to government or public control from private ownership, private management, or public-private partnership is termed remunicipalisation (Figure 4). Following Mann & Warner (2019, p. 39), it may be termed as ‘reverse privatisation’. Around 267 cases of water remunicipalisation in 37 countries have been documented between

2000 and 2017, affecting more than 100 million people. Of the 267 cases of remunicipalisation, 63 occurred in the United States (Kishimoto & Petitjean, 2017; McDonald, 2019; Mann & Warner, 2019).

Figure 4

Process of Remunicipalisation



Though remunicipalisation is a global phenomenon, it has happened mostly in two countries – France and the United States. Besides, cities in many countries, such as Turkey, Ghana, Argentina, Bolivia, Malaysia, Hungary, Mali, Tanzania, and Guinea, have experienced changes in water management and governance systems through remunicipalisation (McDonald & Swyngedouw, 2019). McDonald & Swyngedouw (2019) note that the global database shows an increasing trend in private-sector participation in water management, and that this trend is continually encouraged by governments, international financial institutions, multilateral agencies, and professional water associations. Thus, the future of remunicipalisation is highly complex from political, legal, and economic perspectives.

Almost all the apex international agencies that work on water issues have remained silent on remunicipalisation. However, there is a significant opportunity to engage in constructive debate on the issues of 'public water' vs 'private water' (McDonald, 2019). Several obvious reasons for that return or shift in the water management system exist, including political, legal, and economic aspects. Usually, the private sector has strategies to make maximum profit from any business it is involved in. Sometimes, they increase service costs to such a level that they are not affordable for all. Remunicipalisation happened mainly because private companies were limited in including all sections of people within their service network. Mann & Warner (2019) have analysed the case of the remunicipalisation of the water sector in Missoula, where private equity firms aimed to make a profit for their stakeholders rather than to supply water to all. Therefore, to serve the people equally with basic services, privatisation cannot be the only solution. Both systems, whether public or private, have limitations and merits, but success depends on context. "Increasing power asymmetries between municipalities and international private equity firms raise questions about the future of water regulation" (Mann & Warner, 2019, p: 394). Amid the complex public/private binary, a new concept of 'alter-globalisation' has emerged to promote greater space for the construction of alternative community economies of water (Bakker, 2007).

The commodification of water cannot uphold the conditions required to ensure human rights. Following the recommendation of the UN General Assembly (2010), the process is underway to consider water as a right. Almost all apex international development agencies support the argument that water issues should be considered from the perspective of water rights (Bakker, 2007). Remunicipalisation is a valid alternative that mainstream water management organisations can no longer ignore. It will certainly dominate the debate around water issues (management and governance) of the next decade. Open discussion on remunicipalisation will help decide the best water governance practices, i.e., whether to continue/renew private contracts or return water services under public control (McDonald, 2019). McDonald & Swyngedouw (2019, p. 329) have opined "future remunicipalisation strategies will need to be grounded in their local realities, alert to the regional and international trends that continue to shape water policies". Urban water supply is part of the organised production system; thus, it is more closely associated with the city's economic, social, and political dynamics (Gupta, 1994; Strang, 2004; Bell, 2015).

Considering the case of Darjeeling, where the majority of households cannot afford private water, these issues must be addressed to determine the city's water status. Here, around 23% of the total population lives in slums without an in-house piped water supply. They only use community taps (if available and functioning) and community toilets. The majority of slum households (77%) are unwilling to pay for water. Around 66% of the total population are non-workers/unemployed in the city (Census of India, 2011). In these circumstances, increasing dependence on private water supply may place a burden on the already stressed household budgets of the poor and marginalised. Though the water supply system is not formally privatised here in Darjeeling, the municipal authority has no control over the present water market in the city. As discussed earlier, if there is sufficient political will, private initiatives may work successfully. In this regard, Perard (2006), as cited in Kumar (2014), argued that private participation in urban water management is suitable if the country is politically stable and the government is powerful. Therefore, considering the long political instability of Darjeeling (Gorkhaland movement for getting the status of a separate state), and the affordability of the residents, it can be argued that water must be treated as a 'public good' here. Only this can ensure the rights of a large section of people to water.

Conclusion: Towards Water Justice

From the entire analysis, a few factors are noted that lead to the fast-growing water market and increasing dependence on private supply. These are: inadequate, irregular, and unequal public water supply; very high installation cost for in-house municipal connections; cumulative pressure of permanent and floating population on the already overstrained water infrastructure; drying of springs and deteriorating discharges of springs during the long dry period; increasing demand from the tourism sector; and increasing construction activities. All these factors are either directly or indirectly associated with the ULB's weak water governance. The city government cannot meet the city's growing demand, and at the same time, the ULB is not looking after the natural springs that serve many people in the city. Moreover, local respondents stated that the elected representatives of Darjeeling ignore water scarcity after elections and facilitate the entry of private operators to create a market in the water supply system.

Political interference in the water crisis makes the issue even more complicated. However, the issue is only highlighted during the pre-election campaign. Before elections, all political parties promise to

supply sufficient water. Here, the level of attention to water scarcity by all political leaders oscillates with the election cycle. Multi-scalar politics strongly regulate the city's water supply system, extending from the decisive role of the state government to the intervention of local political leaders. In a centralised urban water supply system, multiple stakeholders, diverse user groups, and multilayered politics interact to produce a complex hydraulic environment within the city.

The state has not formally privatised the water sector of Darjeeling. However, the informal entry of private operators into the water sector has become common in many Indian cities under a market-friendly economy. Banerjee-Guha (1994) has defined a market-friendly economy as a system where limited state control and increased privatisation of urban basic services are common practice. Due to the complex interplay of different factors, the average cost of water becomes much higher for the poor than for well-off citizens. Local political parties and the city administration have not implemented any pro-poor policies to improve basic services like water. The municipal authority has provided statistics on various development schemes in slum areas in various reports, but the impacts of these developments are hardly evident there. With limited financial means, people have to minimise their needs through various adaptive strategies or negotiations. The situation can be described as 'consumerism is the only reality', where people with money can access resources or utilise opportunities. As Chaplin (2011) noted, the political participation of the poor is noticeable. However, their influence is invisible in policymaking because the upper and rich classes of society mainly control development programmes. Harris et al. (2011) also opined that water provision is deeply interlinked with political decisions in a particular space, whether urban or rural.

After extensive conversations with several target groups, it is clear that the nature of water scarcity in the city is not natural; rather, it has been created to some extent for profit (Koner & Samanta, 2021c). Therefore, existing circumstances are not beneficial for the majority of city residents, especially the poor and the marginalised. Following Bakker (2007), it is recommended that the concepts of 'commons' and 'common-pool resources' could bring positive changes to the city's current water situation. Bakker (2007, p. 447) argued that "'commons' is an effective strategy for combating privatisation because it correctly opposes a collective property right to private property rights". The article also argues for effective water governance by the city administration through managing and reviving common water sources in and around the city and supplying public water equally, irrespective of class and power, to ensure water justice in the long run.

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There is no conflict of interest regarding this article.

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Abstract
The rapid advancement of information, communication, and technology in recent decades has effectively compressed global space, fostering closer connections across distances. In parallel, migration dynamics have undergone notable transformations, with student mobility emerging as a significant component. Increasingly, students migrate in pursuit of improved educational opportunities, which are often linked to enhanced long-term economic prospects. This paper examines internal migration in India, with a particular focus on student migration patterns and trends, drawing on national-level migration data. The analysis points to a discernible rise in education-related migration in recent years. One of the central drivers of this phenomenon is the uneven distribution and limited capacity of educational institutions, particularly in higher education. Consequently, migration for education functions as a strategic response to systemic inadequacies within the educational infrastructure.
Keywords: Internal migration, educational migration, higher education, enrolment

Introduction

Educational Growth and the Mobility Imperative

Over the past few decades, government initiatives to expand educational access through enhanced school infrastructure and to overcome barriers such as poverty and discrimination have considerably boosted student enrolment. As of 2024, a record 247 million students attend around 1.47 million schools nationwide, benefiting from increased access to quality education and opportunities to achieve their academic goals. These ongoing efforts have resulted in reduced dropout rates and higher school completion, allowing more students to pursue higher education. Consequently, the demand for tertiary education has surged, evidenced by the recent growth in colleges and educational institutions. Data from the University Grants Commission (UGC) shows that the number of university-level institutions in India, including both private and public sectors, has quadrupled over twenty years, now exceeding forty-five thousand colleges and over eleven hundred universities.

The rapid expansion of higher education institutions, especially in the private sector, is primarily driven by the increasing demand for higher education. This heightened demand has led the government to streamline its regulatory policies to facilitate growth. The University Grants Commission (UGC) has recognised this surge, noting that current university

and college capacities are far below the actual demand. As a consequence, students face significant challenges due to the shortage of both institutions and access to their preferred courses. This problem is particularly severe in regions with limited higher education infrastructure.

Consequently, many students migrate from their native villages and towns in pursuit of better educational opportunities. Migration data consistently highlight 'education' as a major motivating factor for internal movement. This paper aims to analyse overall migration trends and patterns, with a specific focus on educational migration flows. It will also explore the connections between education and migration using secondary data sources.

In existing research on migration, the relationship between migration and education has been examined through the lens of educational qualifications that enable economic (skilled) migration. Several studies have noted an increase in the movement of skilled professionals and academics in recent years (Khadria, 2006; Gurucharan, 2013; Tejada et al., 2014). As such, the focus has largely remained on economic drivers and their outcomes. Although education is recognised as a critical factor influencing earnings at both origin and destination locations (Wills, 1989), the role of education as a direct cause of migration, especially within the country, has received limited attention. This is particularly significant for the population under 25 years of age, for whom migration to pursue education may serve as a stepping-stone to future economic opportunities. Many students remain in the city or region where they studied to seek employment, although this depends on job availability and other external conditions.

Despite extensive research on migration processes, educational migration, particularly internal educational migration, remains underexplored in the Indian context. Much of the existing literature focuses on international student mobility, while the movement of students within India between villages, towns, districts, or states has not been studied. This gap is critical, as large-scale educational migration often highlights shortcomings in the availability and quality of local educational infrastructure.

An important distinction between educational and economic migration lies in the direction of funds flow, represented in Figure 1. In economic migration, earnings are typically remitted from the destination to the place of origin, supporting family members back home. In contrast, educational migration involves financial dependency, with money flowing from the origin, where parents or guardians often send funds to the destination where the student is based or studying. This reversal in the flow offinances characterises educational migration as a dependent form and requires deeper analysis.

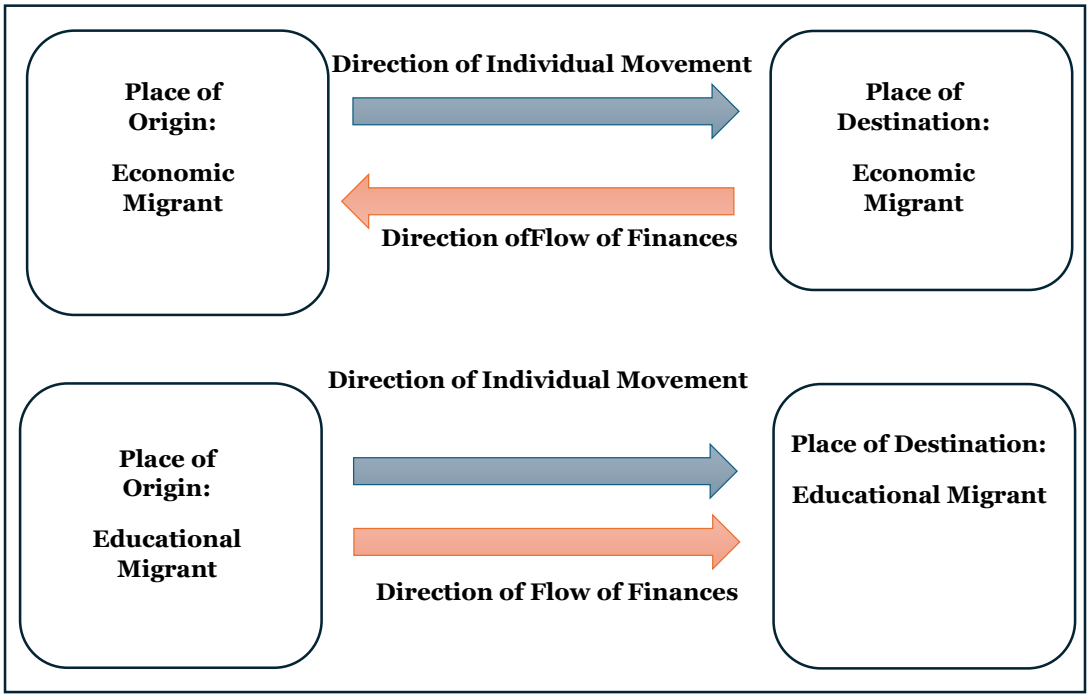
Moreover, the consequences of such internal migration can be felt in destination areas. The influx of students from other regions often leads to heightened competition for limited seats, which state governments may raise, thereby disadvantaging local students and pushing them toward lower-ranked institutions. Therefore, educational migration has broader social and institutional implications that extend beyond individual aspirations. These observations suggest that educational migration is not only an important but also a complex process, with impacts that reach far beyond immediate academic outcomes. In-depth research is essential to unpack the underlying causes and to inform effective policy-making that addresses both regional disparities and the long-term effects of internal student mobility.

Migration and Educational Interlinkages

The NITI Aayog (2025) report on expanding quality higher education highlights

pronounced regional disparities in access to higher education across India, with Gross Enrolment Ratios (GER) ranging from as low as 15 per cent in Bihar to as high as 54 per cent in Sikkim. Despite a substantial expansion of the university system since 1950, higher education continues to rely heavily on an extensive network of state public universities and, more recently, private colleges and universities. Most states in India have a shortage of higher education institutions, leading to an outflow of human capital to other states. However, internal mobility for education is highly intra-state (Chandrasekhar & Sharma, 2014). This pattern reflects mobility from rural pockets to more educationally developed regions within a state, serving as a stark reminder of the persistent, though gradually narrowing, regional disparities observed in other low- and middle-income countries, including India. (Singh, Manchanda & Mishra, 2023).

Figure 1
Directions of Flows: Movement of People and Finances Between Place of Origin and Place of Destination



Source: Prepared by the author.

The literature on student migration is very limited for internal migration, whereas international student migration has been studied more extensively. The OECD (2010) on international student mobility highlights that globalisation and the required global economic integration demand cultural and linguistic knowledge, which could be acquired through education and student mobility; this has been further facilitated by advancements in communication technologies and the rapid flow of information. The World Migration Report (2008) states that increased trends in student mobility result from reduced travel and communication costs, along with efforts by governments to encourage university and cultural exchanges, attract highly qualified personnel, and offer economic opportunities for migrants.

However, Weber and Mol (2023), using UNESCO data on international student mobility, report that destination-country characteristics have different effects for students from origin countries, based on the stages of development. Migration also has profound implications for educational systems, particularly in how they respond to and shape migrant experiences. Banks (2007), in a comparative study of citizenship education, advocates for pedagogical frameworks that promote inclusivity and cultural pluralism, particularly in migrant-receiving contexts. Educational institutions, he argues, are not merely sites of learning but also arenas where national identity, social cohesion, and cultural recognition are negotiated, often in unequal and contested ways.

Trzcinski and Randolph (1991), analysing Malaysian data, emphasise that migration, education, and job search processes are integral components of human capital investment. Their findings suggest that decisions to migrate are often economically motivated, shaped by anticipated returns to education and enhanced employment prospects in urban centres. In the Bangladeshi context, Giani (2006) explores the educational consequences of rural-to-urban child migration. Although such mobility is frequently associated with school discontinuation or interrupted learning, she contends that migration may also serve as a pathway to educational opportunity, particularly when rural infrastructure is deficient and economic vulnerabilities are acute. Migration, in this sense, becomes a strategic response to structural inequalities in educational provision. A similar dynamic is observed in Venezuela, where Levy and Wadycki (1974), employing econometric modelling, demonstrate that educational attainment plays a decisive role in shaping internal migration patterns. Their analysis highlights how variations in regional economic opportunities and wage expectations intersect with education levels to influence mobility decisions.

International research offers further insights into the complex interrelationship between migration and education. Rosenzweig (2007) investigates the global phenomenon of skilled migration or "brain drain," arguing that international wage differentials and perceived returns on educational investment are central to explaining the emigration of highly educated individuals. His findings depart from earlier homogeneous models of skilled migration, emphasising instead the diversity of patterns and motivations that characterise global mobility among educated populations.

Finally, internal migration within India has also shaped state-level higher education policy. Responding to mounting competition for limited urban educational infrastructure, the Delhi government in 2017 (HT, 2017) introduced a policy reserving 85 per cent of seats in state colleges for local students. With approximately 250,000 school graduates annually and relatively few higher education slots available, such measures reflect the intensifying pressure that internal migration exerts on metropolitan educational systems.

Migration: Dynamics and Determinants

Migration refers to the movement of individuals or groups from one geographical location to another, motivated by factors such as improved economic prospects, escape from conflict or environmental challenges, and, in some cases, the pursuit of better educational opportunities. This movement significantly affects the economic, cultural, and social landscapes of both the origin and destination regions (Carling 2024; Srivastava, 2011; Bhagat & Keshri, 2018). Understanding the patterns, trends, and magnitude of migration is essential for policymakers and planners, as it helps in designing responsive strategies to address demographic shifts and their accompanying challenges.

According to Trewartha (1953), migration is indicative of the racial, linguistic, and national integration of the global population. This observation reinforces the idea that migration is a complex, multifaceted global phenomenon, with no universally applicable definition or standardised criteria across all spatial or administrative levels. In addition to the more obvious drivers, migration is also shaped by a wide range of 'push' and 'pull' factors. Push factors are those conditions in the place of origin that compel individuals to leave, often due to hardship or lack of opportunity. At the same time, pull factors are the attractive conditions in destination areas that encourage voluntary relocation (Bigsten, 1996).

In his influential work *A Theory of Migration*, Lee (1966) categorises the causes of migration into four key groups:

1. Push factors from the place of origin
2. Pull factors associated with the destination
3. Intervening obstacles, such as distance, cost, and social or ethnic barriers
4. Personal factors, which influence individual decision-making

However, migration is not always a straightforward response to push or pull conditions. As Ellis (2000) argues, migration reflects a continuum of motivations and constraints, varying between individuals and households and even across time for the same person or family. Thus, Wouterse (2010) suggests moving beyond the traditional push-pull dichotomy and recognising a more nuanced range of influences on migration decisions. Nonetheless, migration decisions are influenced by perceived differences in the utility or quality of life between two locations. While specific patterns may differ across regions due to varying socio-economic conditions, there is often a common set of motivations that underpin migration across populations. As noted by the World Bank (2006), these motivations can usually be traced to a blend of economic, social, ethnic, and political considerations, each shaping the decision to migrate in complex ways.

Despite these complexities, Bhende and Kanitkar (1997) note that migration typically involves deliberate decision-making, where individuals or households exercise agency in choosing to relocate. Migration, therefore, should be understood as a process involving human volition, rather than solely as a reaction to external conditions.

Objectives and Methodology

The central objective of this paper is to examine the relatively underexplored dimension of migration for educational purposes, more broadly conceptualised as student mobility. While migration has long been studied in relation to labour markets, livelihoods, and development, its educational dimension has received comparatively limited scholarly attention, particularly in the Indian context. This paper seeks to address this gap by situating educational migration within broader patterns of internal mobility and the structural transformations of higher education.

The analysis is organised into three interrelated components. First, it investigates the patterns, trends, and magnitude of internal migration within India, providing the necessary context to understand how educational mobility is embedded in broader processes of demographic and spatial redistribution. Second, it examines the growth, diversification and expansion of higher education in India, tracing both institutional developments and the changing demand for higher studies. Third, it explores the intersection of these two domains by analysing educational migration patterns and trends, illustrating how the pursuit of education has become a significant driver of internal mobility.

Given the limited availability of secondary data, the paper primarily relies on the Census of India as the most comprehensive source for capturing migration forms, while acknowledging the inherent limitations of such data in fully disentangling educational motivations. Methodologically, the study employs descriptive statistics to map the magnitude, distribution, and temporal shifts of educational migration. The research offers insights that are pertinent to both migration and educational policy in India by highlighting student mobility as a crucial aspect of internal migration. This allows us to establish a more nuanced view of the association between migration and education.

Understanding Migration

Definitions and Database

Migration is a multifaceted phenomenon that lacks a uniform definition or measurement, and the aims and parameters of specific studies often shape its conceptualisation. Institutions and agencies involved in migration data collection adopt varying definitions, each aligned with their distinct operational or policy objectives. Two widely used criteria for classifying individuals as migrants are their place of birth and their last place of usual residence.

Migration, in its broadest sense, denotes the movement of individuals from one defined geographic area to another or over a specified minimum distance within a given reference period, accompanied by a change in usual residence (Kok, 1998). The United Nations defines a migrant as "an individual who has shifted their usual place of residence by crossing a migration-defining boundary or traveling a minimum required distance at least once during the stipulated migration interval". From these varying perspectives, it becomes evident that both time and distance are fundamental elements in defining migration. Any comprehensive definition must therefore incorporate both spatial (geographic) and temporal (duration) dimensions to capture the full complexity of migration.

The Indian Context

In India, the conceptualisation of migration varies across institutional frameworks, reflecting differing definitions and methodologies. The two principal sources of migration data are the Office of the Registrar General of India, which collects data through the decennial *Population Census*, and the National Sample Survey Office (NSSO), which conducts periodic surveys approximately every five years.

The *Census of India* defines a migrant as someone who has moved from one politically defined area to another, typically from a village in rural areas or a town in urban contexts. It identifies migrants using two criteria:

1. *Place of Birth* – if the place of enumeration differs from the individual's place of birth.
2. *Place of Last Residence* – if the current usual place of residence differs from the previous one.

The *Migration in India Report* (2021-22) by the NSSO adopts a broader approach, defining a migrant as "a household member whose last usual place of residence, at any point during the six months preceding the survey, was different from the current place of enumeration". In addition to long-term migration, the NSSO also captures:

- *Return Migration*, referring to individuals who have returned to a previous usual place of residence, and
- *Short-term Migration*, referring to those who, without changing their UPR, were away for 1 to 6 months in the past year for employment or job search.

While available data on migration offer a rich and comprehensive source of information, several limitations affect their effectiveness for timely research and policy

planning. One of the primary constraints is the significant time lag between data collection and publication, which limits migration analysis's responsiveness to current trends. Additionally, the data are disaggregated only up to the state level. They are typically based on the place of last residence, capturing only in-migration, necessitating indirect estimation of out-migration, often through analysis of corresponding in-migration data from other states.

Internal Migration in India: Migration is generally classified into two broad categories: internal and international. Internal migration refers to the movement of individuals within a country's territorial boundaries; in contrast, international migration involves the cross-border movement of people from one nation-state to another.

In its 2016 study on internal migration in India, the World Bank notes that both intra-state and inter-state migration rates remain significantly lower thanin countries such as Brazil, China, and the United States. The report attributes this limited internal mobility not solely to physical distance or socio-economic inequality, but also to institutional and administrative barriers, particularly the restrictions and frictions associated with state boundaries. Furthermore, linguistic diversity, cultural heterogeneity, and uneven regional development are identified as additional factors that constrain population movement within the country (Vasanathan et al., 2023). This section seeks to analyse the magnitude, patterns, and evolving trends of internal migration in India, focusing on movements within national borders and the structural determinants influencing such mobility.

Magnitude and Trends in Migration: The scale of internal population movements, as reflected in the Census of India, indicates that the number of people moving out of their place of residence has increased significantly. Table 1 shows India's internal migration rate increased steadily between 1981 and 2011, from over 201.6 million to over 453.6 million. The long-term trend shows a noticeable rise, particularly among women, despite minor fluctuations in total migration rates. Due to marital migration and economic movement from rural to urban regions, migration rates were consistently higher in rural areas than in urban areas. Urban migration rates decreased slightly in 2011, despite increasing urbanisation, indicating intricate regional and gendered mobility patterns.

Figure 2 further illustrates notable shifts in internal migration patterns in India between 1971 and 2011, highlighting a consistent increase in migration rates, particularly after 1981. Although the decade 1971-81 recorded relatively modest growth, subsequent periods saw a marked acceleration, with the overall internal migration growth rate rising from 19.4 per cent in 1971-81 to 45.4 per cent in 2001-11. Male migration exhibited the most substantial increase, surging from just 3.2 per cent in 1981-91 to 58.4 per cent in 2001-11. This sharp rise suggests the influence of broader structural transformations in the Indian economy, including labour market realignments, regional development initiatives, and the diminishing pull of traditional rural-to-urban migration channels. In the Indian context, structural processes such as urbanisation and industrialisation have been key drivers of rural-to-urban migration, fostering both economic development and social transformation (Bhagat, 2017).

Table 1

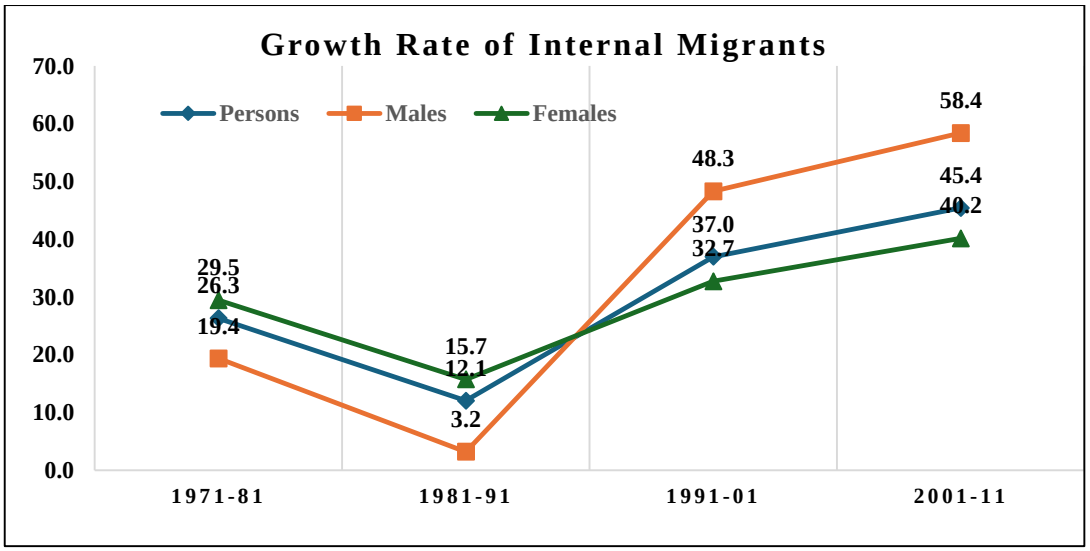
Number of Migrants by Last Residence and Migration Rate: 1981-2011

Census Year	Place of Residence	Number of Migrants			Migration Rate		
		Persons	Male	Female	Persons	Male	Female
1981	Total	20,16,07,061	5,92,35,306	14,23,71,755	30.3	17.2	44.3
	Rural	14,35,83,222	3,13,54,273	11,22,28,949	28.3	12.1	45.3
	Urban	5,80,23,839	27,88,1,033	3,01,42,806	36.8	33.2	40.8
1991	Total	22,58,87,846	6,11,34,303	16,47,53,543	27.0	14.1	40.9
	Rural	15,91,90,095	3,11,96,064	12,79,94,031	25.0	9.8	42.5
	Urban	6,66,97,751	2,99,38,239	3,67,59,512	31.0	26.3	36.2
2001	Total	30,93,85,525	9,06,77,712	21,87,07,813	30.1	17.0	44.1
	Rural	20,77,73,661	4,25,28,896	16,52,44,765	28.0	11.1	45.8
	Urban	10,16,11,864	4,81,48,816	5,34,63,048	35.5	32.0	39.4
2011	Total	45,36,41,955	14,09,62,280	31,26,79,675	37.46	22.62	53.21
	Rural	30,84,36,693	7,99,10,254	22,85,26,439	36.99	18.68	56.29
	Urban	10,31,59,179	4,47,59,786	5,83,99,393	27.36	22.90	32.16

Source: Census of India, D3 Tables: 1981, 1991, 2001 and 2011. Office of the Registrar General of India.

Figure 2

Growth Rate of Internal Migrants by Place of Last Residence in India



Source: Census of India, D3 Tables: 1981, 1991, 2001 and 2011. Office of the Registrar General of India

Migration Patterns: Census data on migration not only provides information on its magnitude but also reflects the directions in which people move. Migration patterns in India are generally classified into a) Intra-district migration – movement within the same district; b) Inter-district migration – movement between districts within the same state; c) Intra-state migration – a broader category that includes both intra-district and inter-district movements, capturing migration occurring within a single state; and d) Inter-state migration – movement across the boundaries of states or union territories.

Changes in administrative boundaries, such as the creation of new districts or states between census periods, can alter the classification of migrants. Hence, a cautious interpretation of migration statistics over time is essential, as these reclassifications complicate the assessment of internal migration trends and patterns in India.

The Census data on migration, apart from the magnitude, also show the

directions people are moving. Migration patterns are typically classified as: a) Intra-district migration: movement within the same district; b) Inter-district migration: movement across districts within the same state; and a and b, when combined, can also be categorised as c). Intra-State migration: movement within the state, and c). Inter-state migration: movement across state or union territory boundaries. Changes in administrative boundaries, such as the creation of new districts or states between census periods, can significantly affect the measurement of migration. In such cases, individuals who would previously be classified as intra-district or inter-district migrants may now be recorded as inter-district or inter-state migrants. Therefore, a careful examination of trends and patterns over time is essential for understanding the complex nature of internal migration in India.

Table 2

Percentage Distribution of Internal Migrants by Last Residence in India: 2011

	Area	Persons	Males	Females
Total Internal Migrants	**Total**	***45,57,87,621***	***14,61,45,967***	***30,96,41,654***
Internal Migrant in India		98.71	98.17	98.97
Intra State Internal Migrants		87.94	83.36	90.08
Intra District Internal Migrants		61.68	57.82	63.49
Inter District Internal Migrants		26.26	25.55	26.59
Inter State Internal Migrants		12.06	16.64	9.92
Total Internal Migrants	**Urban**	***10,63,55,920***	***4,59,62,228***	***6,03,93,692***
Internal Migrant in India		98.80	98.63	98.92
Intra State Internal Migrants		81.25	80.64	81.72
Intra District Internal Migrants		45.49	47.29	44.12
Inter District Internal Migrants		35.77	33.35	37.61
Inter State Internal Migrants		18.75	19.36	18.28
Total Internal Migrants	**Rural**	**29,51,14,410**	**7,35,22,596**	**22,15,91,814**
Internal Migrant in India		98.93	98.22	99.17
Intra State Internal Migrants		89.16	80.96	91.86
Intra District Internal Migrants		64.09	54.85	67.13
Inter District Internal Migrants		25.07	26.10	24.74
Inter State Internal Migrants		10.84	19.04	8.14

Source: Census of India, D3 Tables, 2011. Office of the Registrar General of India.

These movements indicate the distance one travels in the pursuit of migration. Table 2 illustrates migration patterns in the latest Census data, and it is clear that the number of people who move is directly proportional to the distance they travel. Of the total internal migration in India, 87 per cent comprises intra-state movements, compared to only 12 per cent who move intra-state. Those moving from urban areas travel longer distances (inter-state) than those moving from rural areas, where intra-district movements are the highest (68 %).

Migration Streams*:* Internal migration flows in India can be categorised into four primary streams based on the origin and destination of movement: i) Rural to urban; ii) Urban to rural; iii) Rural to rural; and iv) Urban to urban. Analysing migration through these streams provides more than a spatial or temporal understanding; it allows for a deeper exploration of the socio-economic dynamics between rural and urban areas.

Over time, internal migration across state boundaries has increased significantly. Identifying the specific streams that migrants follow is critical to understanding whether the dominant trend favours urbanisation or reflects a continued reliance

on rural networks. Among these, rural-to-urban migration holds developmental significance due to its impact on urban growth, infrastructure stress, and service delivery systems (Selod & Shilpi, 2021). However, rural-to-rural migration remains the most prevalent stream, largely driven by female migration for marital reasons, which is less economically motivated but socially embedded.

Census 2011 data indicate that approximately 53 million individuals migrated, 21 million from rural to urban areas, 6.2 million from urban to rural areas, and around 14.2 million between urban centres. A longitudinal analysis of these figures, given in Table 3, reveals a declining trend in the share of rural-to-rural migration from 64 per Cent in 1991 to 47 per Cent in 2011, signalling a gradual reduction in the dominance of rural-origin migration over the past three decades. In contrast, migration involving urban destinations has increased in proportional terms. While urban-to-rural migration has remained relatively stable, urban-to-urban migration has risen notably, involving both male and female migrants and reflecting the growing importance of urban networks and the role of emerging urban centres in shaping migration patterns.

Within the rural-to-rural stream, marriage accounted for about 77 per cent of movements in 2011, whereas employment accounted for the fewest migrants, at 17 per cent. The rural-to-urban stream had 54.5 per cent moving in search of employment, followed by education, with 42 per cent of migrants moving to urban areas to seek education. A similar trend for the movement of employment and education was also visible from the urban streams.

Reasons for Migration*:* The Census of India 2011 classifies migration based on seven principal reasons reported at the last place of residence: work/employment, business, education, marriage, moved at birth, accompanying family, and other unspecified causes. This classification highlights distinct gender-based trends in internal migration; employment remains the predominant driver for male migration, while marriage overwhelmingly accounts for female migration. Migration due to factors such as moving with parents or other household members is the second most common reason for both male and female migrants, indicating the importance of family-based or household-level mobility patterns in shaping internal migration dynamics.

Data from the 2011 Census shows that approximately 161 million individuals migrated within India in the decade preceding the enumeration. Of these, nearly 60 million (37%) cited marriage as the primary reason for migration (Figure 3). However, this stream is highly gendered, wherein around 58 million women (constituting 56% of all female migrants) moved due to marriage, compared to only 2.6 per cent of male migrants. This significant gender disparity in marriage-related migration skews the overall migration profile, particularly the magnitude and direction of population flows. When marriage-induced migration is excluded from the analysis, a markedly different picture of internal migration emerges: more employment-centric, male-dominated, and involving longer-distance movements (Rajan, 2013).

For male migrants, employment remains the leading factor, accounting for approximately 27 per cent of movements. The second most significant factor is migration with family, contributing to 19 per cent of male migration cases. Migration for educational purposes, while limited in overall volume, accounted for 3.2 per cent of all internal migrants. Here again, gender differences are evident: 5.3 per cent of male migrants moved for education, compared with only 2.1 per cent of females.

Table 3

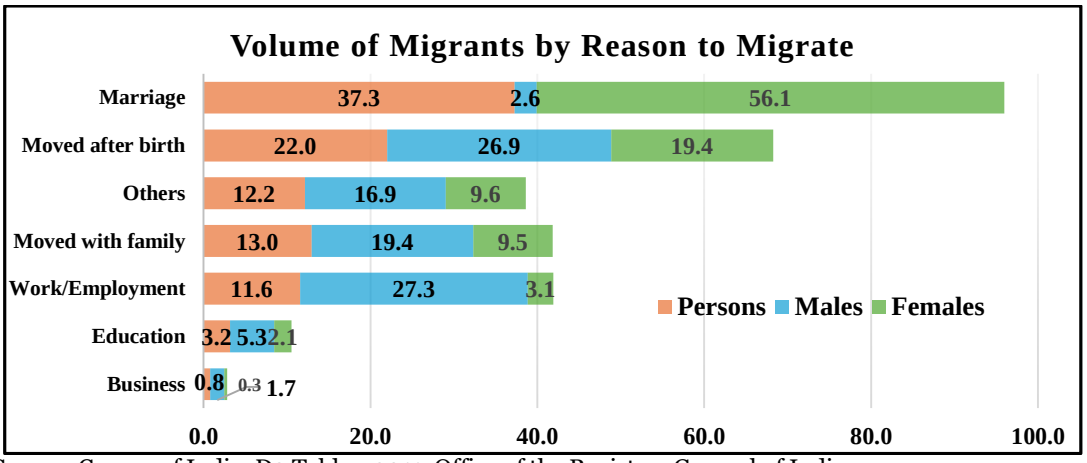
Percentage Distribution of Internal Migrants by Last Residence in India by Different Streams: 1991-2011

Migration Stream	1991			2001			2011		
	M	*F*	*T*	*M*	*F*	*T*	*M*	*F*	*T*
Rural to Rural	43.3	72	64.2	28.8	66.6	55.5	25.6	57.8	47.5
Rural to Urban	29.8	13.2	17.7	27	12.4	16.7	24.7	14	17.4
Urban to Rural	7.4	5.4	6	5	3.9	4.2	7	5.5	6
Urban to Urban	18.9	9	11.7	18.2	9.2	11.8	24.5	14	17.4

Source: Census of India, D-2 Tables: 1981, 1991 and 2001, Office of the Registrar General of India.

Figure 3

Gender wise Reasons for Migration by Last Residence in India: 2011



Source: Census of India, D3 Tables, 2011. Office of the Registrar General of India.

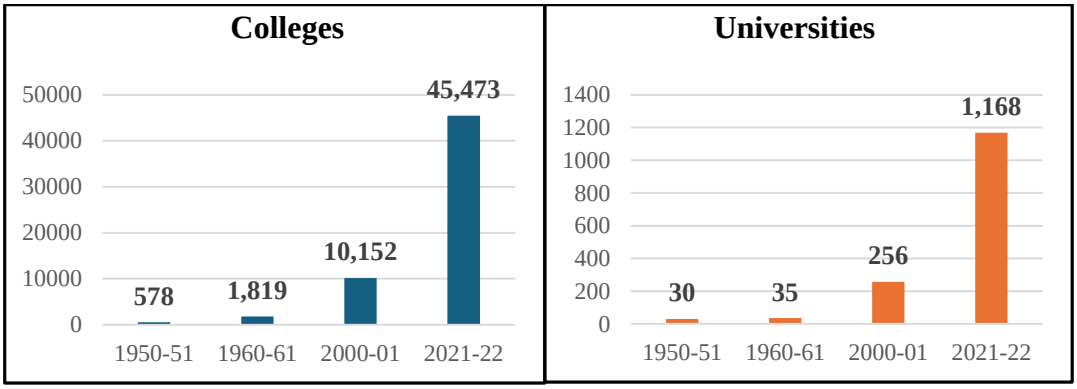
Growth of Higher Education in India

India's education sector has undergone significant expansion across all levels of primary, secondary, and tertiary education. Reforms aimed at strengthening school education have played a pivotal role in catalysing the growth of higher education. Figure 4 illustrates that the number of colleges increased dramatically from 578 in 1950-51 to 45,473 in 2021-22, while the number of universities rose from 30 to 1,168 during the same period. Although the long-term growth trajectory has been substantial, the rapid expansion in the last two decades stands out, with the number of higher education institutions nearly quadrupling. This surge reflects both policy-driven efforts and rising demand for access to tertiary education in a diversifying economy. (NITI Aayog, 2025).

While the number of overall institutions has increased, the number of privately managed institutions has grown more significantly. The Deccan Herald (July 2025), in an article on private university accountability, highlighted that "since 2014, over 150 private universities have been approved in India under progressively liberalised norms. The UGC's 2016 amendment reduced the requirement for 'deemed-to-be-university' status from 10 years of operation to just five, triggering a wave of new entrants. They further highlight that a policy shift led to a 153 per cent increase in private universities, compared to a mere 12 per cent rise in public institutions over the same period. This indicates growing demand for post-secondary education across regions, although growth has not been consistent across India.

Figure 4

Number of Colleges and Universities in India: 1950-2021

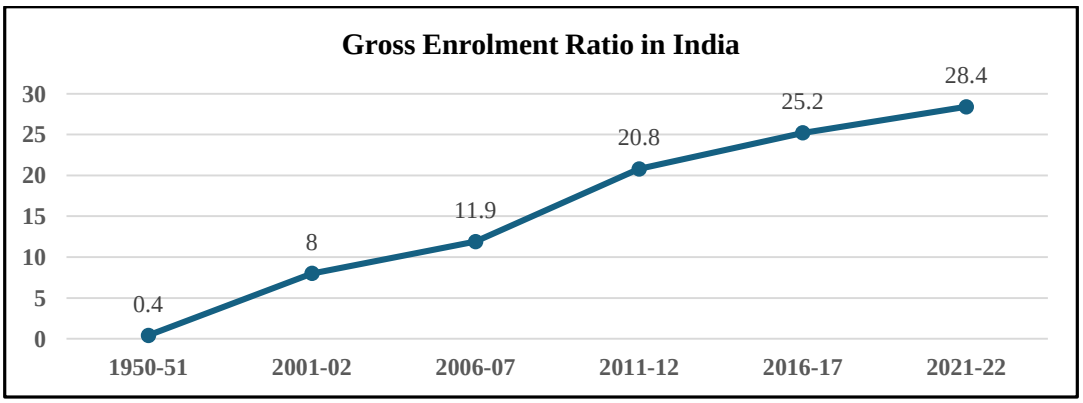


Source: AISHE 2021-11, Ministry of Education.

Enrolment Trends: Figure 5 illustrates the Gross Enrolment Ratio (GER) in higher education in India from 1950-51 to 2021-22, showing a significant consistent upward trend over the decades. Beginning at a mere 0.4 per cent in 1950-51, the GER rose sharply to 8 per cent by 2001-02, reflecting the impact of expanding access to post-secondary education. It further increased to 11.9 per cent in 2006-07, followed by a substantial jump to 20.8 per cent in 2011-12, coinciding with major policy initiatives and institutional expansion. The upward growth continued, with GER reaching 25.2 per cent in 2016-17 and eventually 28.4 per cent in 2021-22, indicating ongoing progress toward the massification of higher education. This steady rise reflects both growing demand for tertiary education and sustained public and private sector efforts to widen access, especially over the last two decades.

Figure 5

Gross Enrolment Trends in India: 1950-51 to 2021-22



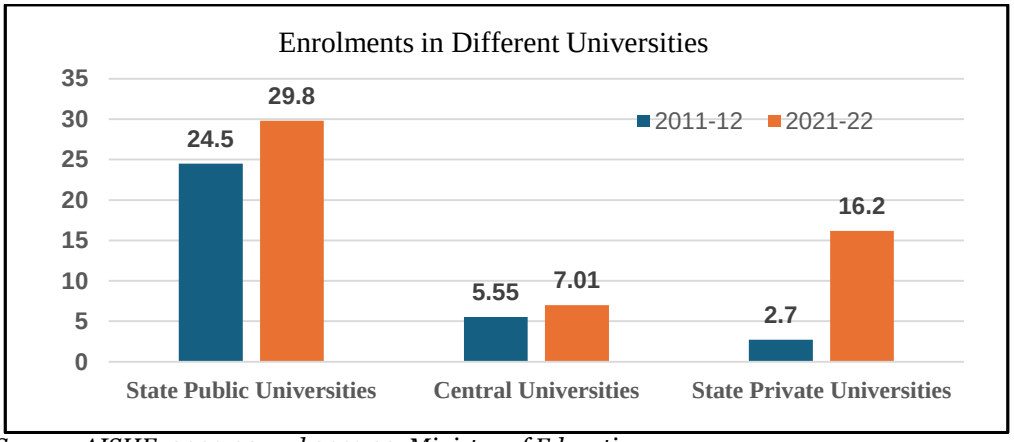
Source: NITI Aayog Report on Expanding Quality Higher Education through States and State Public Universities. Pp. 22.

Figure 6, based on the AISHE 2021-22 data, further depicts trends in student enrolment across three types of Indian universities: State Public Universities, Central Universities, and State Private Universities for academic years 2011-12 and 2021-22. During this period, State Public Universities saw a moderate rise in

enrolments, increasing from 24.5 lakh to 29.8 lakh, indicating a gradual expansion of state-level public higher education. Central Universities also experienced steady growth, with enrolments rising from 5.55 lakh to 7.01 lakh. In contrast, private universities recorded the most substantial increase, with student numbers jumping from 2.7 lakh to 16.2 lakh, more than a fivefold increase.

Figure 6

Enrolments in Different Universities in India: 2001 and 2011



Source: AISHE, 2021-02 and 2011-22, Ministry of Education.

This notable surge highlights the expanding role of private institutions in meeting growing demand for higher education, possibly influenced by constraints in public university capacity, shifting educational policies, and greater student willingness to invest in private options. Overall, the data reveals a transformation in India's higher education sector, characterised by the accelerating presence of private universities alongside continued contributions from public institutions (NITI Aayog, 2025).

Migration for Education in India

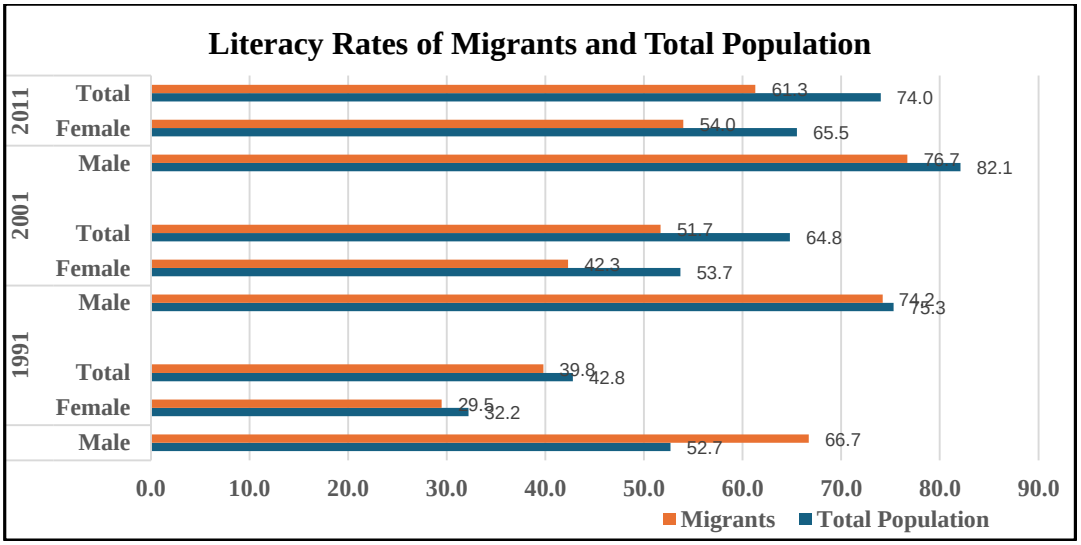
The preceding sections have examined migration and education as separate phenomena. This section considers them jointly to explore their interrelationship. Drawing on Census data, it analyses migrants' literacy and educational attainment and further investigates the spatial distribution of individuals who migrated for educational purposes.

Literacy Among Migrants

This section examines migrants' literacy levels relative to the overall population, offering insights into the educational composition of the migrant group. The data from the Census 2011 (Figure 7) suggests that individuals who have migrated generally possess lower literacy levels than the broader population. This trend is particularly

evident in migration patterns from the 1990s, when a substantial proportion of the illiterate population moved. Although literacy among migrants has improved over time, the disparity between migrants and the total population has widened, in contrast to earlier census years when this difference was relatively minimal. (Kundu 2007, Srivastava 2011 and Deshingkar and Sandi 2011)

Figure 7
Literacy Rates of Migrants by Last Residence and Total Population in India: 1991-2011



Source: Census of India, D3 Tables, 2011. Office of the Registrar General of India.

Gender-wise analysis highlights important contrasts. Male migrants at the earliest reference point exhibit higher literacy rates than their counterparts in the general male population (66.7% vs 52.7%), suggesting educational selectivity, particularly in economically driven migration. However, in the subsequent periods, male migrants recorded slightly lower literacy rates than males in the total population, indicating a narrowing or reversal of this advantage.

In contrast, female migrants consistently report lower literacy rates than women in the general population. Across the three reference points, the literacy rates for female migrants are 29.5 Percent, 42.3 per cent, and 54 per cent, while the corresponding figures for the total female population are 32.2 per cent, 53.7 per cent, and 65.5 per cent. The literacy gap between migrant and non-migrant women is particularly pronounced in the latter two instances, exceeding 11 percentage points. This suggests that female migration is less likely to be associated with educational attainment, and more frequently linked to marriage or familial obligations, in which education is not a determining factor.

When considering the aggregate literacy levels, the pattern of disparity remains consistent. The most significant gap is observed in the latest period, with a 12.7-percentage-point difference. This indicates that although male migrants may bring some educational capital, the overall literacy of the migrant population remains lower, primarily due to the persistently low educational attainment among women.

Educational Qualification of Migrants

An in-depth analysis of the educational attainment of those migrating for work, in relation to the spatial extent of their mobility, is essential for unpacking the complex interlinkages between migration and education. Census 2011 data, as reflected in Table 4, highlight disparities in educational outcomes among migrants, shaped by gender, type of migration, and spatial trajectory.

Table 4
Education Level of Internal Migrants Reporting Work/Employment as a Reason for Migration: 2011

Education level 2011	Within State				Interstate			
	Rural-Urban		Urban-Urban		Rural-Urban		Urban-Urban	
	Male	Female	Male	Female	Male	Female	Male	Female
Illiterate	14.0	28.9	7.4	15.5	15.47	38.31	8.0	13.8
Literate but below Matric/Secondary	30.2	24.4	19.7	19.6	33.07	21.11	19.9	13.4
Matric/Secondary but below graduate	26.7	18.3	27.7	21.4	25.74	14.46	22.3	14.6
Technical diploma or certificate not equal to degree	3.7	3.2	4.8	3.2	2.69	2.42	2.9	2.7
Graduate and above other than technical degree	16.1	15.2	25.6	24.5	13.10	13.83	27.2	32.7
Technical degree or diploma equal to degree or post-graduate degree	5.2	5.6	10.3	10.7	6.25	6.02	15.7	18.6

Source: From Singh and Biradar (2022 Migration in India: trends and characteristics. Migration Tables D7: Migrants by Place of Last Residence with Duration 0-9 years reporting. pp.7.

Female migrants, particularly those engaged in rural-to-urban interstate migration, are disproportionately concentrated in the lowest educational categories. Among this group, the illiteracy rate is notably high, reaching 38.31 per cent, the highest across all migration streams. In contrast, migrants moving between urban areas across state boundaries exhibit significantly higher educational attainment. Within this stream, over 27 per cent of male and 32 per cent of female migrants possess graduate or higher (non-technical) degrees, indicating a strong positive correlation between educational qualifications and long-distance, urban-centric migration.

Although the overall proportion of technically qualified migrants remains modest, it is comparatively higher among interstate urban-to-urban migrants. These trends suggest that interstate migration, particularly between urban centres, is associated with greater educational capital. Conversely, intra-state rural-to-urban migration dominated by women is predominantly characterised by lower levels of educational attainment.

The data thus underscore the dual influence of spatial and gendered dynamics in structuring educational inequalities within India's migration landscape. Migration trajectories, especially those involving longer distances and urban destinations, appear to selectively benefit individuals with higher educational credentials, while reinforcing existing disparities among less-educated, rural-origin female migrants.

Spatial Pattern of Student Migrants

The spatial dynamics of internal educational migration in India are marked by a strong preference for intra-state movement, with notable variations by gender and rural-urban location. Table 5 illustrates that over 5.4 million internal student migrants, 86.2% relocated within their home state, 53.8% within the same district and 32.4% across districts, while only 13.8% crossed state boundaries, reflecting a tendency to pursue education close to home.

This localised pattern is more pronounced among females: 88.9% migrated intra-state and 58.4% within their own district, compared to 84.5% and 50.9% among males. Males are more likely to undertake inter-state migration (15.5%) than females (11.1%).

Urban areas have a higher proportion of inter-state educational migration (24.3%) relative to rural areas (8.6%), suggesting

that cities attract students from wider regions, likely due to greater institutional availability and diversity. Nonetheless, intra-state migration remains dominant even in urban areas (75.7%), with 43.2% moving across districts. Gender disparities persist in urban contexts, with males more likely than females to migrate across state lines (26.0 % vs 21.7%). In rural settings, educational migration is even more geographically restricted: 91.4% remain within their state, and 64.1% within the same district. Rural females exhibit the highest intra-district migration (69.6%), likely due to socio-cultural constraints, safety concerns, and domestic responsibilities. In contrast, rural males demonstrate relatively higher geographic mobility, with 29.1% migrating across districts and 10.5% across states.

Table 5

Spatial Patterns of Internal Migration by Last Residence in India: 2011

Spatial Pattern of Migration	Area	Persons	Males	Females
Internal Migrants for Education	Total	54,02,238	32,59,778	21,42,460
Intra State Migrants for Education		86.23	84.48	88.89
Intra District Migrants for Education		53.84	50.87	58.35
Inter District Migrants for Education		32.39	33.61	30.54
Inter State Migrants for Education		13.77	15.52	11.11
Internal Migrants for Education	Urban	17,61,058	10,62,573	6,98,485
Intra State Migrants for Education		75.69	73.99	78.27
Intra District Migrants for Education		32.44	30.72	35.07
Inter District Migrants for Education		43.25	43.28	43.20
Inter State Migrants for Education		24.31	26.01	21.73
Internal Migrants for Education	Rural	33,82,646	20,44,957	13,37,689
Intra State Migrants for Education		91.37	89.54	94.17
Intra District Migrants for Education		64.06	60.40	69.64
Inter District Migrants for Education		27.32	29.14	24.53
Inter-State Migrants for Education		8.63	10.46	5.83

Source: Census of India, D3 Tables, 2011. Office of the Registrar General of India.

Overall, while education remains a key driver of internal migration, movements are predominantly confined to local and intra-state contexts, particularly among rural and female populations. Although urban centres offer broader opportunities and attract inter-state migrants, state borders still represent a significant barrier. These patterns reflect ongoing structural and socio-cultural limitations that shape educational mobility in India.

Concluding Remarks

India's educational landscape reflects significant disparities shaped by region, caste, gender, economic status, and other social factors. The state's role in delivering education is equally uneven, with several regions still lacking even basic schooling infrastructure. In such areas, access to higher education remains limited. As the country grapples with rising demand for higher education alongside limited institutional capacity, students often address these gaps by relocating to areas with better educational opportunities. Consequently, migration for education becomes a strategic response to systemic shortages, particularly in higher education.

This paper centres on migration, with a specific focus on education-related mobility, a subject less explored than economic migration. The analysis aimed to capture trends, patterns, and the scale of student migration within India, focusing exclusively on internal migration across intra-district, inter-district, and inter-state levels. Educational migration within the country reveals distinct trajectories that

reflect broader structural inequalities. A clearer understanding of these internal movements can support more inclusive policymaking, address regional disparities, and improve student support mechanisms.

The research draws on national-level migration data, and the findings indicate a notable rise in education-related migration in recent years. At the national level, a little over 3 per cent of the population migrated for educational purposes. Male students were more likely to migrate for education than female students; additionally, migration from rural areas exceeded that from urban regions, suggesting both a lack of local educational access and growing rural demand for better academic opportunities.

While these statistics offer a general overview, they also underscore the broader role of education in driving social transformation and upward mobility. Understanding the dynamics of educational migration is essential for creating targeted policy interventions, expanding access, and reducing geographic and social inequalities in education. Supporting students through improved infrastructure, equitable distribution of institutions, and inclusive planning will be critical to ensuring fair and widespread educational access across India. Also, more studies focused specifically on educational migration are needed to better understand its determinants.

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Determinants of Declining Child Sex Ratio in Punjab: A Case Study of Rural and Urban Areas

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Abstract
The present study investigates the micro-level determinants of the declining child sex ratio in both rural and urban areas of Punjab. The primary objective is to understand prevailing attitudes towards the girl child and to identify the key socio-cultural and economic factors responsible for this imbalance. This study is based on primary data collected in 2022-23 from selected rural and urban areas. A total of 164 respondents were surveyed, selected using stratified random, purposive, and snowball sampling techniques. The analysis indicates that the most significant factor responsible for the decline in the number of female children relative to male children in both rural and urban areas is the preference for sons. This preference is deeply rooted in the patriarchal structure in North-West India, including Punjab, where sons are associated with economic utility, lineage continuation, and support in old age. Another significant factor, particularly in urban areas, is female foeticide, facilitated by the availability of sex-determination technologies. Additionally, economic considerations such as dowry and high wedding expenses, especially in rural areas, reinforce the perception of daughters as a financial burden. Other contributing factors include stopping-rule behaviour after the birth of a son, social insecurity of girls, and persistent traditional mindsets.
Keywords: child sex ratio, patriarchal structure, son preference, sex-determination technologies and dowry demand.

Introduction

The term child sex ratio (CSR) is defined as the number of females per thousand males in the age group 0-6 years. It is a basic measure that reflects attitudinal changes in society, especially regarding the girl child. It is a powerful index for examining the ground realities of gender imbalance in this age group. It may be considered one of the significant parameters for analysing the socio-economic, cultural and religious development in society. Most importantly, it indicates the desirability of female children and their survival rates in society. It has a profound effect on the demographic structure of an area (Trewartha, 1953 and Qazi, 2006). It is one of the most important social indicators for measuring the extent of prevailing equity between males and females in a society at a specific point in time and space.

Discrimination against girl children is one of the emerging forms of inequity. The discrimination against girl child is

widespread, and the girl child is continuing to face discrimination and violence at the global level (United Nations, 2016). The situation of adverse child sex ratio is more pronounced in the South Asian countries. Sen (1990) draws attention to the phenomenon of declining child sex ratio due to gender discrimination in his study "100 Million Missing Women" in the world. South Asia has been experiencing gender inequality, especially between boys and girls, since ancient times. Child sex ratio has continued to decline despite improvements in the general welfare of females, which points towards deeply rooted structures of gender inequality (Larsen & Hatti, 2008). The adverse child sex ratio in India is a fertile research theme for demographers and other researchers from various disciplines. The rapid decline in the child sex ratio is a serious problem with notable socio-economic, cultural and demographic implications (WHO, 2011). The rate of decline in the number of female children relative to male children is not uniform across the country. There are spatial variations in this context. It is important to mention here that all the north-eastern, eastern and southern states of India recorded relatively high child sex ratios in every population group (total, rural and urban). In comparison, the north-western states of India recorded a relatively low child sex ratio as compared to the southern and eastern states. Deep-rooted patriarchal culture along with highly practised sex-selective abortions are the leading factors for the deteriorated position of child sex ratio in northern and north-western India. On the other hand, the child sex ratio is quite balanced in the areas marked by traditional matriarchal culture in the southern and tribal population in north-eastern India (Kaur & Singh, 2023).

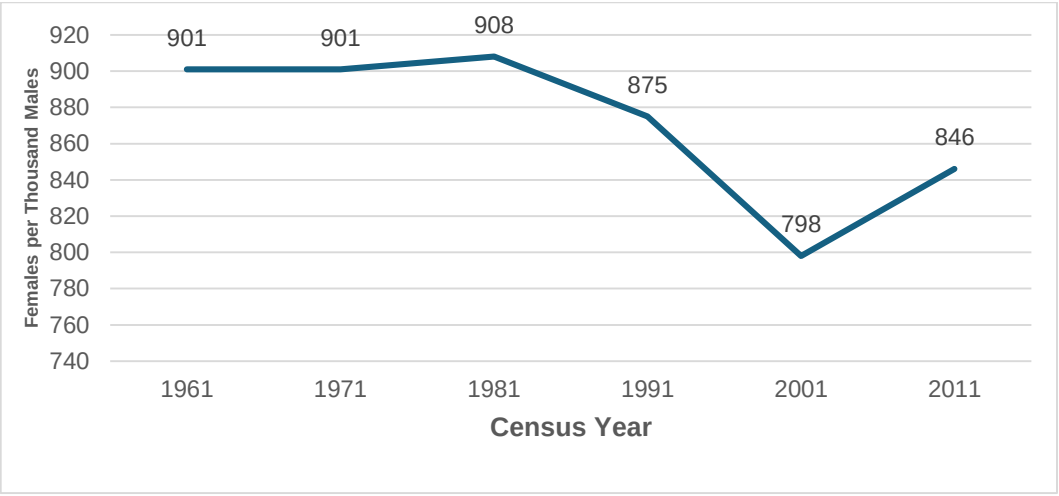
Punjab is one of the north-western states of India with a relatively low child sex ratio. Moreover, Punjab ranked second-lowest after Haryana in terms of child sex ratio, as per the Census of India, 2011. Contemporary Punjab has recorded an unfavourable child sex ratio, which reinforces the historically deteriorating position of females in society. According to the report entitled "Combating Female Foeticide: A Perspective Plan" of the Department of Health and Family Welfare, Government of Punjab, 2007, out of fifteen districts in the country with the most unfavourable child sex ratio, ten are in Punjab. This indicates that the state has recorded relatively high discrimination against the girl child. The state's patriarchal culture has played a notable role in this regard. The state's patriarchal culture promotes son preference (Gill, 2013). This attitude plays an important role in the higher neglect of the girl child in favour of having a son. People have preferred to have at least one son in the family for various socio-cultural and economic reasons since earlier times.

Moreover, new reproductive sex-selective technologies have also contributed to widening this gender gap. Punjab was a forerunner state in adopting these sex-selective technologies. Sex-selective abortion advertisements spread widely in Punjab and Delhi in the late 1970s and early 1980s (Patel, 2007). Punjab was also where the first ultrasound clinic was opened in the late 1970s (Purewal, 2010). Gradually, ultrasound clinics mushroomed across the study area, especially in cities and towns. Over time, several sex determination centres were established even in the rural areas of the state. Thus, the rapid mushrooming of sex determination centres and their easy availability in rural and urban

areas are also responsible for the low child sex ratio in the state. Apart from son preference and sex-selective abortions, other key factors, such as the custom of dowry, the social insecurity of girl children, and the old-age mindsets of people, are also responsible for the decline in the child sex ratio in Punjab (Kaur & Singh, 2022).

Figure 1

Trends of Child Sex Ratio in Punjab: 1961-2011



Source: Census of India, 2011. Primary Census Abstract, India.

Furthermore, Punjab has also experienced inter-regional and inter-decadal variations in the child sex ratio. As per the 2011 Census, the average child sex ratio in Punjab was 846 females per 1,000 males. A continuous decline has been observed in the study area in terms of child sex ratio from 1981 to 2001. The maximum decline (77 points) was recorded between 1991 and 2001. The curve shows a positive change, improving by 48 points in 2011 compared with 2001 (Figure 1). Rural-urban disparity in terms of child sex ratio has also been observed in Punjab. The child sex ratio in urban areas of Punjab was comparatively higher (852) than that of rural areas (844). The rural-urban differentials in child sex ratios result from social, cultural, economic, and political conditions prevalent in these areas. On the other hand, among the three traditional geographical regions of Punjab (Majha, Malwa, and Doaba), variations in the child sex ratio have also been observed. As per the 2011 Census, the child sex ratio was relatively high in the Doaba region (872), followed by Malwa (848) and Majha (823). Of the 20 districts in Punjab, more than half recorded a relatively low child sex ratio (fewer than 850 females per 1,000 males). Similarly, of the state's 77 tehsils, 46 recorded a relatively low child sex ratio in 2011. Among all the tehsils of Punjab, Nakodar (Jalandhar district) recorded the highest child sex ratio (906), while Bhulath (Kapurthala district) recorded the lowest (798) among rural areas. In urban areas, Anandpur Sahib tehsil (Rupnagar district) reported the highest child sex ratio (932), while Nihal Singhwala tehsil (Moga district) reported the lowest (743).

Various socio-economic factors are responsible for the deteriorating child sex ratio in the state, including cultural

preferences for male children, economic pressures, and inadequate access to education for girls. However, at the micro level, few efforts have examined these factors. Few studies examine the deteriorating child sex ratio and its related factors at the micro-level. With this in mind, the present case study has been conducted in various rural and urban areas of Punjab to examine the ground realities of this emerging issue and its related factors.

Objectives

1. To investigate the attitudes towards girl children at the micro-level.

2. To identify micro-level factors responsible for the declining child sex ratio.

3. To examine the rural-urban differentials in terms of factors affecting child sex ratio.

Materials and Methods

The present study is based entirely on primary data collected from rural and urban areas of Punjab during 2022-23. For this purpose, two villages (Khursheidpur and Mehmadpur), one each from the tehsils that recorded the highest (Nakodar) and the lowest (Bhulath) rural child sex ratio in Punjab, were selected for the field survey. In addition, two urban areas (Anandpur Sahib and Badhni Kalan), one each from the tehsils that reported the highest (Anandpur Sahib) and the lowest (Nihal Singhwala) urban child sex ratio in Punjab, were selected. Ten per cent of the total households in the selected villages (Khursheidpur and Mehmadpur) were selected for the survey, whereas one per cent of the total households in the urban areas (Anandpur Sahib and Badhni Kalan) were selected for this purpose. The study included 164 respondents (Table 1). Geographically, both selected villages are in the Doaba region, whereas the selected urban areas are in the Malwa region (Figure 2).

Stratified random and purposive sampling methods were used for data collection. Snowball sampling was also used to identify households suitable for data collection. In addition, married couples were selected as respondents throughout the field survey. Respondents from various social and age groups, as well as different educational backgrounds, were surveyed to gain a comprehensive understanding of the state's child sex ratio by examining their diverse viewpoints.

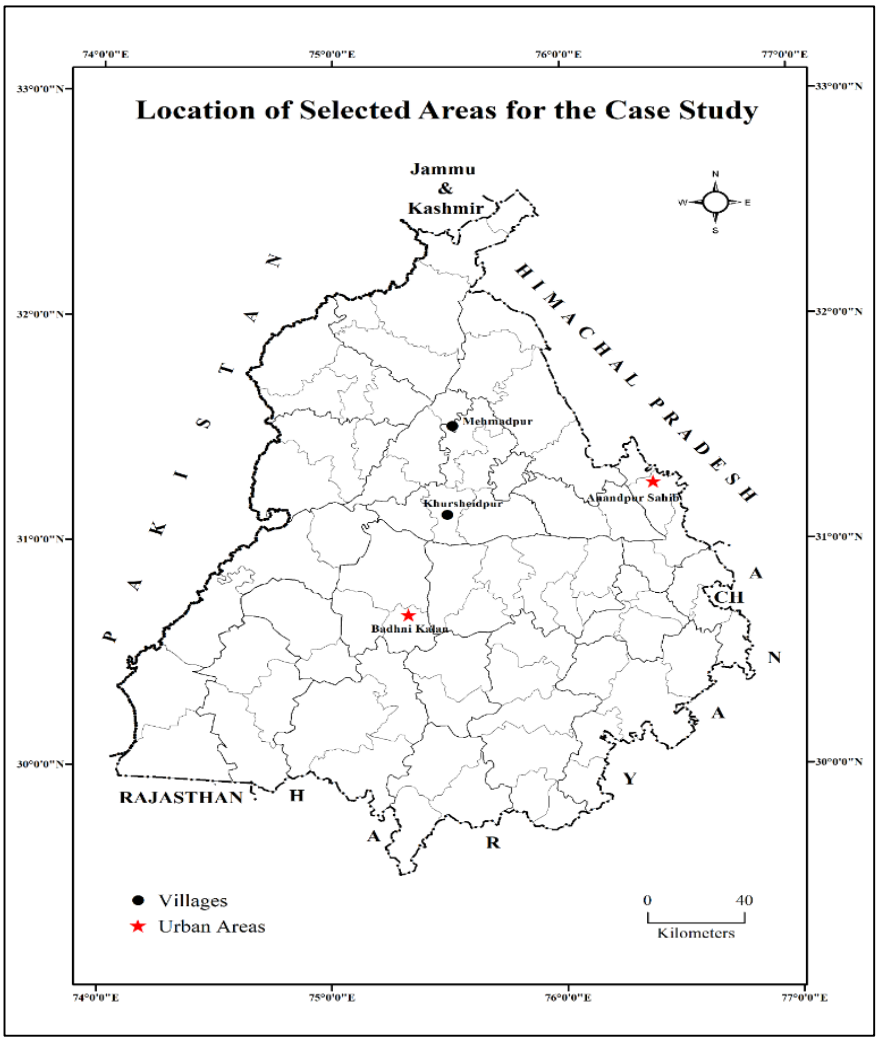
Table 1

Surveyed Households from Selected Areas for Field Survey in Punjab

Areas	Tehsil	District	Total Households	Surveyed Households	Respondents	
					Male	Female
Anandpur Sahib*	Anandpur Sahib	Rupnagar	3270	33	33	33
Badhni Kalan*	Nihal Singhwala	Moga	1309	13	13	13
Khursheidpur**	Nakodar	Jalandhar	204	20	20	20
Mehmadpur**	Bhulath	Kapurthala	162	16	16	16
Total			**4945**	**82**	**82**	**82**
					164	

Source for Tables 1 to 5: Field Survey, 2022-23
Note: *Urban Area **Village

Figure 2



Source: District Census Handbooks of Punjab, 2011

Results and Discussion

Reasons for Declining Child Sex Ratio

Among the total respondents, the majority said that son preference was the key reason behind the declining number of female children as compared to male children in the state. Moreover, more than one-fourth of respondents stated that female foeticide was responsible in this regard. Further, fifty per cent of the total respondents among all the selected areas said that the burden of dowry and wedding expenses of daughters was responsible for the declining child sex ratio in Punjab (Table 2). An almost equal proportion of respondents stated that stopping rule behaviour after one son (parents stop having more children once they have a male child) and social insecurity of girls in society were other important responsible reasons for the decline in the number of female children. It is worth noting that son preference emerged as a key reason for the declining child sex ratio among respondents across all selected areas (Figure 3).

Table 2

Reasons for Declining Child Sex Ratio (percentage)

Areas	Female Foeticide	Son Preference	Stopping Rule Behaviour After One Son	Dowry and Wedding Expenses	Social Insecurity of Girls	Old-age Mindsets of People	No Idea
Anandpur Sahib	27	33	3	9	8	14	6
Badhni Kalan	23	27	4	19	12	8	8
Khursheidpur	20	43	8	8	5	8	0
Mehmadpur	34	31	6	22	3	3	0
Total	**26**	**35**	**5**	**15**	**6**	**9**	**3**

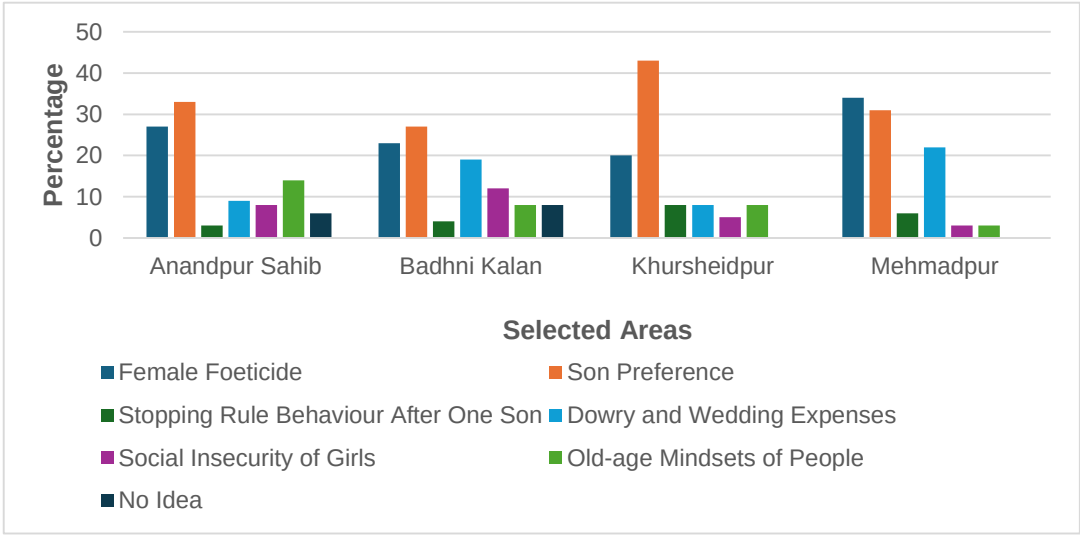
Table 3

Reasons for Declining Child Sex Ratio in Rural and Urban Areas (Percentage)

Reasons	Rural Areas	Urban Areas
Female Foeticide	25	27
Son Preference	38	34
Stopping Rule Behaviour After One Son	7	3
Dowry and Wedding Expenses	20	12
Social Insecurity of Girls	4	7
Old-age Mindsets of People	6	12
No Idea	0	5

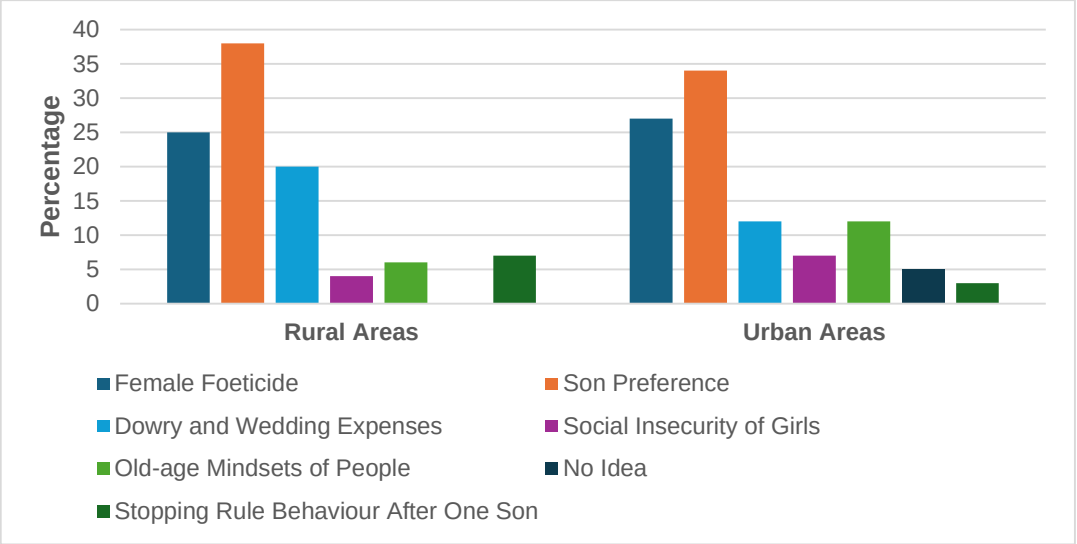
Figure 3

Reasons for Declining Child Sex Ratio



Source of Figures 3 to 6: Field Survey, 2022-23.

Figure 4
Reasons for the Declining Child Sex Ratio in Rural and Urban Areas



In rural areas, the majority of respondents believed that son preference was the main reason behind the declining child sex ratio in the state, mainly followed by female foeticide (25 per cent), dowry and marriage expenses for daughters (20 per cent) (Table 2).

Among all the urban respondents, thirty-four per cent said that son preference was the key reason for the declining child sex ratio in the state, mainly followed by female foeticide (27 per cent). Moreover, an equal proportion of respondents (12 per cent) believed that dowry and marriage expenses of daughters' marriages and old-age mindsets of people were responsible for the worst child sex ratio (Table 3).

Among the factors contributing to the declining female-to-male ratio in both rural and urban areas, son preference has emerged as the most significant reason (Figure 4). According to Umawati (68 years old) and Manohar Singh (65 years old):

"Samaj de pita purkhi dhanche vicho puttar di chahat janam laindi hai atte eh puttar di chahat hi kudian di ginti nu ghatondi hai."

(The desire for a son is born out of the patriarchal structure of society and the desire for a son reduces the number of girls.)

Moreover, the intensity of the desire for a son was found to be higher in the rural areas because patriarchy is more deeply rooted in the rural settings than in the urban settings. Son preference is a deep-rooted phenomenon of Punjabi society, which is responsible for the skewed child sex ratio. Broadly speaking, son preference can easily be traced in all the activities carried out in households. Sons are considered breadwinners in the family, while daughters are considered a burden. Sons are preferred to daughters because males are more valued in families, communities, and societies than females (Croll, 2000; Miller, 1987; and Browne, 2017). Additionally, sons are important because they provide support in old age, actively participate in their parents' funeral rituals, and have relatively high economic value in Punjabi society. Moreover, sons can carry on family lineage, but daughters cannot (Kaur, 2008). Perpetuating the family name is one of the fundamental male duties, and the absence of a male heir is considered a disaster in the

family (Attane & Guilmoto, 2007). On the other hand, girls are considered mainly a family burden in society. Consequently, daughters carry less socio-economic and cultural importance in society.

In addition, female foeticide (increasing number of illegal abortions) emerged as the key reason among the urban areas for the declining child sex ratio. Respondents from urban areas stated that when a male child was not born in the first pregnancy, they, at the time of the next pregnancy, used sex determination techniques to verify the sex of the next child. If the child is a girl, the parents resort to abortion to terminate the pregnancy. Even people from rural areas resort to sex-selective abortions for the birth of female children. Therefore, sex-selective abortions are one of the most responsible reasons for the declining number of girls compared to boys in both urban and rural settings.

Some of the respondents said that the ever-increasing dowry demands and heavy expenses on daughters' weddings have created the problem of declining child sex ratio. They stated that people are always worried about their daughter's dowry. Respondents said that many people committed suicide because they had six daughters, and they could not afford dowry for their marriages. According to Narinder Singh, 36 years old:

"Kharche vadh gye ne ta krke lok ghar vich ik munda hon to baad agla chance nahi lainde, baki eni ghat aamdan vich ik dhee nu palna bahut aaukha."

(Because expenses have increased, people do not take the next chance after having a son in the family; it is very difficult to raise a daughter with such a meagre income.)

It has been observed that rural communities are often tightly knit, and families feel intense social pressure to organise lavish weddings to maintain honour (*izzat*) and prestige. Ceremonies typically involve large gatherings, multiple days of rituals, expensive venues or arrangements, elaborate feasts, and displays of wealth through decorations, clothing, and gifts. Dowry, though legally prohibited, persists in subtle and overt forms. It is not always seen merely as a demand but as a social expectation, where the bride's family is expected to provide cash, gold, vehicles, furniture, and other household goods (Roulet, 1996). In many rural areas under observation, this practice is reinforced by comparison within the community, and families often try to match or exceed the standards set by previous weddings in their kinship group. Failure to do so can lead to social criticism or loss of family reputation. Such behaviour creates a perception among people that raising a daughter involves substantial future financial liability (Rao, 1993). For agrarian households with limited incomes, these anticipated expenses can be overwhelming. As a result, daughters may be viewed, unfairly, as an economic burden. At the same time, sons are perceived as financial assets who will bring a dowry into the family and contribute to agricultural or household income. It ultimately leads to a lower number of female children than male children in Punjab.

Social insecurity about having a female child is another important reason for the declining child sex ratio. One respondent (Mohinder Singh, 40 years old) discussed the social insecurity, honour and shame linked with daughters in society very frankly. He said:

"Ghar vich dhian hon ta badnami toh dar lgda, dhian kyi var galat kadam chak laindian ne ese krke lok dhian jaman to katraonde ne."

(If there are daughters in the house, there is a fear of humiliation because they sometimes take the wrong step; that is why people desist from giving birth to daughters.)

It has been observed that small-size family norms are also responsible for the

declining child sex ratio. The concept of 'small family, happy family,' prevalent in the state, further reduced the number of female children. One respondent, namely, Sanjeev Kumar, 49 years old, stated:

"Lokan vich chotte privar di esha hundi hai ta kar ke hi bhuraun hatya vadh gyi hai, ate kudian di ginti mundean de mukable ghat rhi hai."

(Due to people's desire for a small family, female foeticide has increased, and the number of female children is decreasing as compared to male children.)

Thus, the study reveals that among the reasons, son preference, female foeticide (sex-selective abortions), dowry and wedding expenses of a daughter's marriage, social security of girls, and stopping rule behaviour after one son are the key reasons for the declining child sex ratio in Punjab.

Reasons for Son Preference

Of all respondents, nearly half (48 per cent) believed that a son is required to carry on the family lineage. However, 22 per cent of respondents stated that a son is required to support parents in old age. Table 4 and Figure 5 indicate that 'to carry lineage forward' was identified as the most important reason for son preference among respondents across all selected areas, followed by reasons such as old-age support, inheritance of ancestral property, and social and economic support. Most respondents said that only sons can carry the lineage forward because daughters are *'praya dhan'* (others' property). One respondent (Veer Kaur, 65 years old) stated:

"Puttar rab di daat hunde ne, putran nal ghar di jot jagdi rehndi hai."

(Sons are the gift of God, with sons the flame of the house keeps burning.)

Minder Singh, 75 years old, said:

"Puttar nal privar di jadd lggi rehdi hai kyuki ekali ladki zameen vech ke apne ghar chli jandi hai."

(The roots of the family are connected with the son because an only daughter goes to her in-laws' house after selling the land.)

Table 4

Reasons of Son Preference (Percentage)

Reasons	Anandpur Sahib	Badhni Kalan	Khursheidpur	Mehmadpur	Total
To Carry Family Lineage	32	77	33	50	48
Old-age Support	29	15	20	22	22
To Inherit Ancestral Property	12	4	28	16	15
Patriarchal Society	6	0	13	9	6
Social and Economic Support	21	4	8	3	9

Table 5

Reasons for Son Preference in Rural and Urban Areas (Percentage)

Reasons	Rural Areas	Urban Areas
To Carry Family Lineage	39	43
Old-age Support	21	30
To Inherit Ancestral Property	22	11
Patriarchal Society	12	5
Social and Economic Support	6	11

Figure 5
Reasons for Son Preference

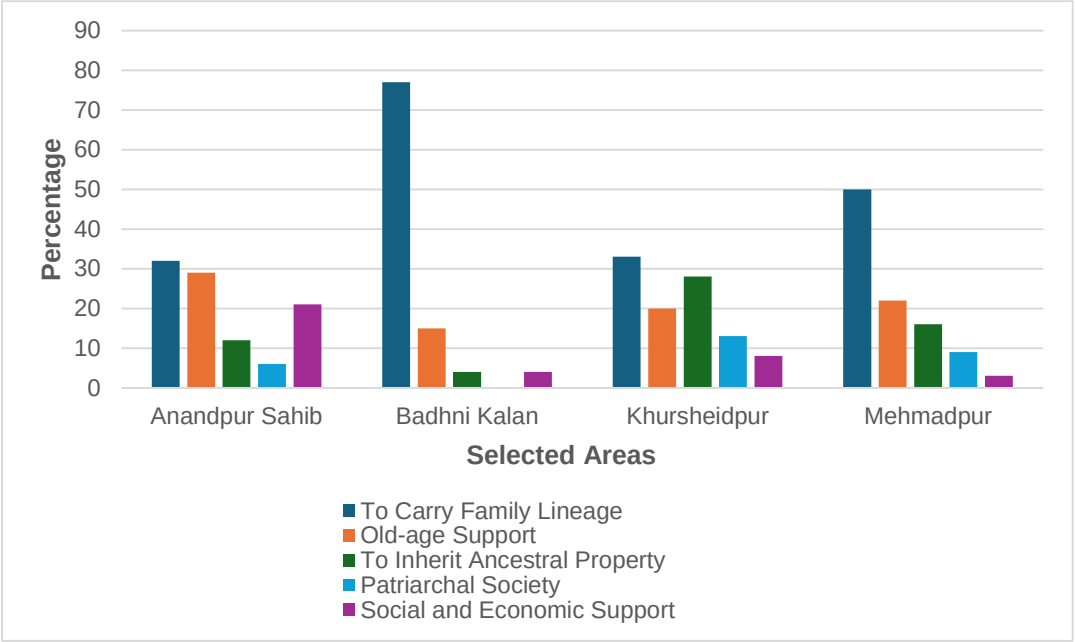
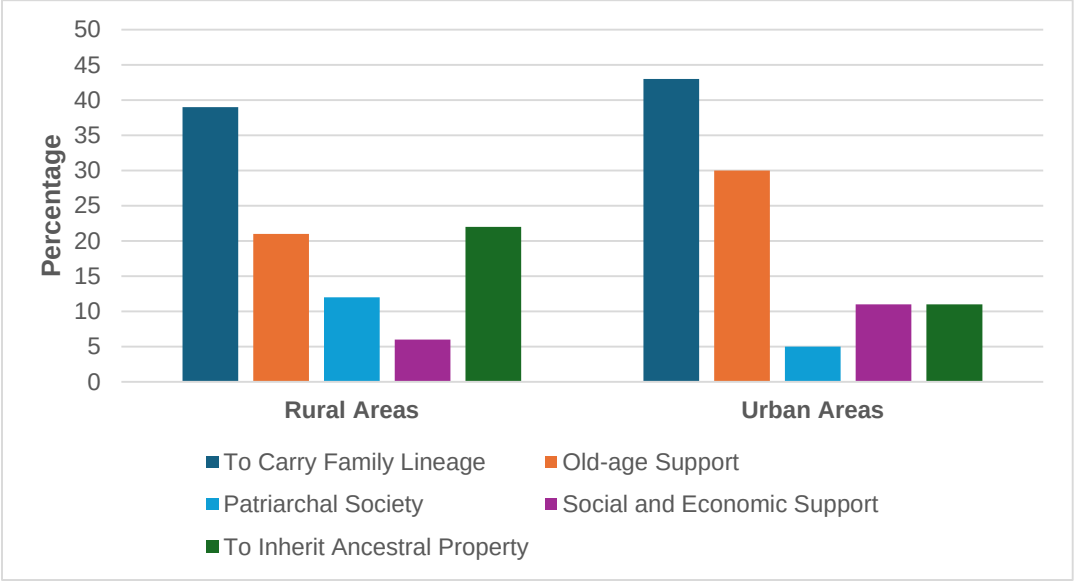


Figure 6
Reasons for Son Preference in Rural and Urban Areas



Rajinder Kaur, 66 years old, expressed the following:

"Mere koi bhra nahi c ta krke main apne husband nu nal lakke apne pekke ghar rehan aa gayi. Es krke mainu bahut mehsus hunda hai ke mera ik bhra jrur hona chahida si jo mere maa-baap nu sambhal sakda si."

(I had no brother, so I took my husband along with me and came to stay at my parents' house. Because of this, I feel very much that I should have had a brother who could take care of my parents.)

Eighty years old, Jeeto talked about her desire for a son in a very stern manner: *"Ghar vich dekka kinian marji hon, amb da butta ta amb da hi hunda"* (no matter how many lilacs you have in your house, only the mango tree is mango), which means no matter how many girls there are in the family because they are bitter, it is important to have sons because they are sweet, like mango.

Thus, it has been observed from the survey that people have quite a good number of reasons for having sons because 'where there is will, there is way.' Conversely, people also cite valid reasons for avoiding having daughters. Therefore, the respondents' preferences are very clear.

Additionally, some respondents believed that sons are the support for their parents in old age. The nagging worry of care in old age also prompts people to have a son. Moreover, a few respondents said that sons are needed to inherit ancestral property.

Among rural respondents, the largest share (39 per cent) said that a son is required to carry the lineage forward, whereas the smallest share (6 per cent) said that sons provide social and economic support to parents, i.e., they need them (Table 5).

In urban areas, the highest number of respondents (43 per cent) agreed that to carry lineage forward, sons are required, followed by the reasons of old age support (30 per cent), inheriting ancestral property and social and economic support (11 per cent) and patriarchal society (5 per cent) (Figure 6).

It has been observed that the preference for a son is deeply entrenched in the Punjabi culture. Some patriarchal traditional folk songs of Punjabi culture clearly show this son preference.

"Chann chariya baap de vehre, ne veer ghar putt janmiya."

(The moon shines in my father's courtyard because a son has been born in my brother's house.)

"Jad ghar janmi dhee ve babula, sochee pai gaye je ve babula."

(O father, when a daughter is born, all the family members are in deep thought).

"Gur khain, puni kattin, app jayin bhra nu ghallee."

(Eat jaggery, spin yarn, you go, send a brother.)

These traditional songs reflect the deep-rooted culture of son preference, which is highly prevalent in Punjabi society. These folk songs depict the birth of a girl as a misfortune for the family, whereas various celebrations follow the birth of a boy. Being a mother of a son is a much more respected position in Punjabi society than being a mother of a girl. Failure to produce a male heir may undermine a family's or a woman's social, economic, and cultural status. Generally speaking, the identity of the Punjabi woman can be established in her husband's household through the process of *pair jammia* (feet having become firm), but, unluckily, her feet can only become fully firm if she produces male offspring in the family (Hershman, 1981). Moreover, it is a time of great 'Pride and Honour' when she becomes the mother of a married son in society, which promotes her from junior to senior status in the family. Even a girl values her brother more than her sister because, in future, her brother will give her major support in this patriarchal society.

On the other hand, those women who face discriminatory attitudes by a male-dominated society from birth to old age are also not willing to give birth to a girl child. In simple words, women who had adverse childhood experiences (in terms of discrimination in all spheres including

childhood status, food, education, mobility, etc.) and presently suffer from high marital instability or dissatisfaction are more prone to discriminating when they give birth to a girl child (Aggarwal & Unisa, 2007). As a result, Punjabi women make many vows and visit many saints and shrines to obtain their first son under pressure from their husband's family. Consequently, due to traditional cultural settings in favour of males, the orthodox nature of the people and a lot of pressure from family on women to produce a son only, play an important role in devaluing a girl child in Punjabi society. It ultimately leads to a low child sex ratio.

Summing Up

The study clearly establishes that the declining child sex ratio in Punjab is not merely a demographic issue but a reflection of deeply entrenched socio-cultural, economic and technological factors operating at the micro-level. The study reveals that son preference emerges as the most dominant factor for the declining child sex ratio in the state. It has been found that the intensity of the desire for a son was higher in rural areas because patriarchy is more deeply rooted in rural settings than in urban settings. The study further shows that female foeticide, facilitated by the easy availability and misuse of modern sex-determination technologies, has been significantly responsible for the decline in child sex ratio, particularly in urban areas. At the same time, economic considerations, such as the burden of dowry and high wedding expenses, reinforce negative attitudes towards daughters, especially in rural settings where social prestige and community expectations intensify these pressures. It has also been found that social security of girls and Stopping Rule Behaviour After One Son are also responsible for the declining child sex ratio in Punjab.

It has been suggested that addressing the declining child sex ratio requires not only the effective enforcement of laws against sex-selective practices but also a profound shift in societal attitudes towards the girl child. Greater emphasis must be placed on education, gender sensitisation, women's economic empowerment and community-based initiatives to promote a more balanced and equitable demographic future of the state.

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Performance of Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) among Scheduled Caste Households: A Case Study of Fatehabad District, Haryana

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Abstract

The Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) was introduced to provide wage employment and livelihood support to rural households, particularly those belonging to socially and economically weaker sections. This paper examines the performance of MGNREGS among Scheduled Caste (SC) households in Fatehabad district of Haryana. The study is based on primary data collected from 524 SC beneficiaries selected across 14 villages, covering all seven blocks of the district, during the year 2025. A mixed sampling approach, including a census method, was adopted. The analysis is based on simple statistical tools such as percentages and averages. The findings reveal that SC households depend heavily on MGNREGS due to limited alternative employment opportunities. Women constitute a major share of beneficiaries, highlighting the scheme's importance in supporting rural SC women. However, the study shows that the scheme has not provided the guaranteed 100 days of employment to most households. Only a small proportion of beneficiaries completed 100 days of work, while a majority received less than 50 days in a year. As a result, the income earned through MGNREGS remains low and works mainly as a supplementary source of income rather than a stable livelihood option. The study also identifies several implementation-related problems, such as remote worksites and non-payment of travel allowances. The paper concludes that although MGNREGS plays an important role in supporting SC households, its effectiveness largely depends on improved implementation and strict enforcement of the scheme's provisions.

Keywords: MGNREGS, scheduled caste, employment, beneficiaries, implementation

Introduction

The Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) is one of the most important welfare programmes introduced by the Government of India to reduce rural poverty and provide livelihood security to poor households (MGNREGA Sameeksha,

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2012; and MGNREGA Sameeksha II, 2014). Its main aim is to offer 100 days of guaranteed wage employment to every rural household willing to do unskilled manual work. For many poor families, especially those belonging to Scheduled Castes (SCs), Scheduled Tribes (STs) and women-headed households, the scheme works like a safety net during periods of unemployment and seasonal shortage of work (Reddy et al., 2014; Swain & Sharma, 2015; Hussain et al., 2025). MGNREGS has helped rural people earn additional income, reduce distress migration, and meet basic household needs such as food, education, and health (Ganeriwala, 2010; Negi et al., 2015; Verma & Saharan, 2016; Murugan & Anshida, 2024; Mareppa & Aleema, 2024).

MGNREGS has also been recognised for improving women's participation in the rural labour force. Many women were able to earn their own income, which increased their confidence and decision-making within the household (Ganeriwala, 2010; Pankaj, 2012; Chatterjee, 2014; Panda & Deka, 2015; Rodriguez, 2021). Apart from these gains, women workers also faced difficulties, including delays in wage payments, long commutes to the worksite, and a lack of awareness of their rights under the scheme (Kar, 2013; Farooqi & Saleem, 2015).

The scheme has also strengthened the purchasing power of poor families and provided them with greater stability during lean agricultural seasons (Kareemulla et al., 2009; Pamecha & Sharma, 2015). In addition to securing beneficiaries' livelihoods, it supported natural resource development through activities such as pond cleaning and strengthening irrigation channels, thereby creating long-term community assets in rural areas (Keerti et al., 2015). These types of work are important for agricultural regions because they help conserve water and improve local productivity.

However, the effectiveness of MGNREGS varies across regions. The delays in receiving job cards, non-payment of unemployment allowance, shortage of sanctioned works, corruption, and the inability of most households to get the full 100 days of employment are major challenges for the successful implementation of the scheme (Arulselvam & Deepika, 2014; Chaarlas & Velmurugan, 2012; and Dung & Pattanaik, 2013). The SC households often demand more work but receive fewer workdays, pointing towards discrimination or weak implementation in some regions. Similarly, low awareness about the scheme's provisions prevents many poor workers from fully benefiting from it (Jahan & Mohan, 2018; Ghatani, 2016).

Fatehabad district, with the largest SC population, has been one of the most successful implementers of the scheme in Haryana. For SC households in the district, MGNREGS is an important supplementary source of income due to the seasonal nature of work and the limited availability of non-farm jobs in the rural agricultural sector throughout the year. Thus, in view of the limited livelihood opportunities for marginalised communities, MGNREGS provide them with wage labour to sustain themselves. However, if the scheme does not provide regular work and wages are delayed, the scheme's purpose is weakened (Chopra, 2014; Narang, 2014).

Against this background, the study aims to explain why the performance of MGNREGS remains limited despite its strong legal framework, and how implementation gaps continue to affect the livelihood security of the SC households in Fatehabad district of Haryana.

Objectives, Data Sources and Methodology

The present study intends to 1) examine the socio-economic profile of SC households participating in MGNREGS in Fatehabad district; 2) analyse the extent of employment, type of work, and income generated through MGNREGS among

Schedule Caste beneficiaries; and 3) identify the major implementation issues and challenges faced by SC households while accessing the benefits of the scheme.

The study was carried out in Fatehabad district, which comprises seven blocks: Fatehabad, Bhuna, Bhattu Kalan, Tohana, Jakhal, Nagpur, and Ratia. The district has a significant Scheduled Caste population that mainly depends on agricultural labour and daily wage work. A total of 14 villages (two from each block) were selected for the survey: one with the highest number of SC job cards and one with the lowest to understand variations in the scheme's participation and performance.

The study is based on primary data collected from 524 SC beneficiaries in 2025. A mixed sampling approach that combined sampling and census methods was adopted. From villages with a large number of job cards, 10 per cent of SC households were randomly selected, whereas in villages with fewer SC job cards, all households were included in the survey. Data were collected using a structured interview schedule. Simple statistical tools such as percentages and averages were used for descriptive analysis.

Results and Discussion

The findings of the study have been arranged according to the objectives of the present research. The results are organised into three main sections to understand how MGNREGS is functioning for Scheduled Caste households in Fatehabad district.

Socio-Economic Profile of Respondents

Understanding the socio-economic profile of respondents is crucial for explaining the level of dependence of Scheduled Caste households on MGNREGS. Factors such as gender, age, and education influence access to employment opportunities, including the choice of MGNREGS as an important source of livelihood.

Table 1 presents the gender distribution of respondents, and it clearly shows that women constitute 71 per cent of the workforce. This finding is significant, as it suggests that MGNREGS is a major source of employment for rural SC women, many of whom have limited employment opportunities (Pankaj, 2012; Narayanan & Das, 2014; Panda & Deka, 2015; and Borah, 2016). It also indicates that the scheme is well suited to implementation in or near villages, making it easier for women to manage work alongside household responsibilities (Chopra, 2019).

Table 1

Fatehabad: Gender wise Distribution of Respondents, 2025

Gender	Number	Percentage
Male	152	29%
Female	372	71%
Total	524	100%
Source of Data: Field Survey, 2025		

The age distribution of respondents, shown in Table 2, reveals that 79 per cent belong to the 30–60 years age group, which represents the most economically active section of the population. This suggests that middle-aged adults who are responsible for family income rely heavily on MGNREGS for income (Negi et. al., 2015; Narang, 2014). This indicates that MGNREGS primarily supports families whose primary earners rely on daily-wage labour. Very young and very old workers are few in number, suggesting that those who most need work tend to participate more.

Table 2

Fatehabad: Age-wise Distribution of Respondents, 2025

Age Group	Number	Percentage
18-30 years	94	18%
30-40 years	173	33%
40-50 years	126	24%
50-60 years	115	22%
Above 60 years	16	3%
Total	524	100%
Source of Data: Field Survey, 2025		

The education status of the respondents, presented in Table 3, also plays a major role in shaping their decisions regarding employment opportunities. In this study, 68 per cent of workers were illiterate, and only 6 per cent had high school education. It reveals a very low level of education among SC workers. Low levels of education limit people's chances of securing skilled or permanent jobs (Ganeriwala, 2010; Manjula & Rajasekhar, 2015). This explains the high dependence of SC households on the MGNREGS scheme for meeting basic livelihood needs.

Table 3

Fatehabad: Educational Status of Respondents, 2025

Education level	Number	Percentage
Illiterate	356	68 %
Primary	136	26 %
High school	32	6% %
Total	524	100 %
Source of Data: Field Survey, 2025		

Overall, the socio-economic profile clearly shows that MGNREGS is reaching the most economically vulnerable households, low-educated, women-dominated families with limited employment options, and middle-aged workers.

Participation in MGNREGS among Scheduled Caste households in Fatehabad district is shaped more by necessity than by choice. The socio-economic characteristics of respondents, particularly low levels of educational attainment and high dependence on daily-wage labour, severely limit access to alternative work opportunities. For women in particular, social norms, household responsibilities, and the absence of locally available paid work further narrow employment choices. In this context, MGNREGS functions as an important source of livelihood support rather than a purely voluntary employment choice. By providing assured and locally available work during periods of employment scarcity, the scheme has become an essential source of income for households with limited alternatives in the study area's rural labour market.

Workdays, Type of Work, and Income Earned

This section examines the number of workdays received, the type of work performed, and the income earned by Scheduled Caste households under MGNREGS in the Fatehabad district. These aspects are important because the scheme's main objective is to provide 100 days of guaranteed wage employment and to ensure minimum livelihood security. Analysing these factors helps explain why, despite high dependence on the scheme, MGNREGS has limited impact on improving the long-term livelihoods of the families dependent on it.

Table 4 shows that most respondents did not receive the guaranteed 100 days of employment. Only 4.6 per cent of households completed 100 days of work. Nearly half of the respondents (48.6 per cent) worked only 0–25 days, while 41 per cent worked 26–50 days in a year. This clearly shows a wide gap between the scheme's promise and its actual delivery. Since Scheduled Caste households depend on MGNREGS due to a lack of other employment opportunities, the limited number of workdays suggests the problem lies with the availability of work rather than workers' willingness to participate.

The fact that most households received less than half of the guaranteed employment weakens MGNREGS' role as a reliable source of income (Chopra, 2014; Narang, 2014). For families that rely on daily wages for survival, the scheme's irregular and insufficient work creates income uncertainty. As a result, MGNREGS provides only partial support and cannot be relied upon year-round, even by households willing to work whenever employment is available.

Table 4

Fatehabad: Number of Workdays Received, 2025

Workdays	Number	Percentage
0-25 days	255	48.6%
26-50 days	215	41%
51-75 days	25	5%
76-99 days	5	1%
100 days	24	4.6%
Total	524	100%

The type of work done under MGNREGS, as shown in Table 5, also affects the scheme's overall impact. A large majority of respondents (67 per cent) were engaged in cleaning irrigation channels, while 30 per cent were engaged in pond cleaning and deepening work. These works mainly involve heavy manual labour and are seasonal. While such activities help improve local infrastructure and agricultural efficiency, they do not provide workers with new skills or stable employment opportunities beyond the scheme (Kareemulla et al., 2009; Keerthi et al., 2015; Rathod et al., 2020). The limited variety of work also reduces the potential to generate employment throughout the year. The nature of work helps explain the dominance of middle-aged workers in the scheme. The study also explains some of the difficulties faced by women workers, who form the majority of beneficiaries. Although MGNREGS has increased women's participation in paid work, the physically demanding nature of the above-mentioned MGNREGS works can limit their ability to work continuously, which in turn reduces their total number of workdays.

Table 5

Fatehabad: Type of Work Done under MGNREGS, 2025

Type of work	Number	Percentage
Cleaning of irrigation channels	351	67%
Ponds cleaning and deepening	159	30%
Other works	14	2.6%
Total	524	100%
Source of Data: Field Survey, 2025		

Table 6 presents the income earned from MGNREGS and shows that earnings remain very low. Nearly half of the respondents (49 per cent) earned less than 10,000 per year, and about 94 per cent earned less than 20,000 per year. These low earnings are mainly the result of fewer workdays rather than low wage rates alone. This clearly indicates that MGNREGS functions as a supplementary source of income rather than a stable livelihood option for Scheduled Caste households. For households with limited assets and no secure employment, such low income from MGNREGS is insufficient to meet basic needs. While the scheme helps reduce immediate financial stress, it does not significantly improve long-term economic security. This explains why many households continue to remain vulnerable even after participating in the scheme.

Table 6

Fatehabad: Annual Income Earned from MGNREGS, 2025

Income Range	Number	Percentage
Below 10,000	257	49%
10,001-15,000	26	5%
15,001-20,000	210	40%
Above 20,000	31	6%
Total	524	100%
Source of Data: Field Survey, 2025		

Overall, the findings in this section show a gap between the high dependence of Scheduled Caste households on MGNREGS and the limited employment and income it provides. The shortfall in workdays, the narrow range of work activities, and the low income earned together explain why MGNREGS has not been able to provide sustained livelihood security to its beneficiaries. These results point towards implementation and planning issues that restrict the scheme's ability to meet the needs of vulnerable rural households in the study area.

Implementation Issues and Challenges

This section analyses the extent to which Scheduled Caste households can access their entitlements under MGNREGS and examines the scheme's actual implementation outcomes based on field data.

A perusal of Table 7 shows that a lack of demand for work does not cause the gap between entitlement and actual benefits, but rather weaknesses in how the scheme is implemented at the ground level. The data shows that job cards were issued to all surveyed households, as the survey was conducted exclusively among workers registered under MGNREGS. However, physical possession of job cards remains limited, with only 64 per cent of respondents reporting having their job cards with them. The absence of physical possession for a substantial proportion of workers limits their ability to verify work records and entitlements independently. Access to the guaranteed 100 days of employment remains extremely limited. Only 4.6 per cent of households completed 100 days of work, while 95.4 per cent failed to reach the guaranteed limit. Households with more working members were more likely to complete 100 days, suggesting that the availability of family labour plays an important role in accessing employment under the scheme.

Table 7

Fatehabad: Implementation Outcomes of MGNREGS, 2025

Entitlements	Responses	Percentage	Remarks
Job card issued	Yes	100	The survey was conducted for households that work under MGNREGS.
	No	Zero	
Job card in possession	Yes	64	The majority of respondents do not have physical possession of Job cards.
	No	36	
Completion of 100 days of work	Yes	4.6	Families with more members completed 100 days of work.
	No	95.4	The majority of respondents failed to secure guaranteed workdays.
Employment generated when demanded	Yes	11	Generated according to works sanctioned.
	No	89	
Employment provided within 15 days	Yes	11	It takes weeks to generate employment.
	No	89	
Work provided within 5 kms.	Yes	21	Active workers go beyond 5 kms for work.
	No	79	
Individual Assets created	Yes	6	The majority of the works fall under PMAY and livestock-related assets.
	No	94	
Sustainability of assets	Yes	100	Assets reported to be of good quality
	No	Zero	
Satisfaction with nature of work	Yes	94	Limited facilities were found to be at worksites.
	No	6	
Satisfaction with worksite facilities	Yes	13	The majority of the respondents were dissatisfied with worksite facilities.
	No	87	
Discrimination in getting work	Yes	16	Discrimination by mate while allocating work to beneficiaries.
	No	84	
Unemployment allowance received	Yes	Zero	Lack of awareness was reported.
	No	100	
Travel allowance received	Yes	Zero	None of the workers ever received it.
	No	100	
Working hours	Less than 8 hours	100	Normal working hours were reported.
	More than 8 hours	Zero	

Entitlements	Responses	Percentage	Remarks
Bank Account linked	Yes	100	All bank accounts are linked to Aadhaar Card.
	No	Zero	
Delay in wage payment	Yes	89	Payment delay led to a debt trap for workers.
	No	11	
Interest on delayed payment	Yes	Zero	No interest paid to workers, which violates scheme entitlement.
	No	100	
Problems faced during work	Yes	85	The majority of workers face problems while working.
	No	15	
Social audit conducted	Yes	95	Regular social audits of works were conducted.
	No	5	
Gram Sabha meeting conducted	Yes	94	Most of the workers participated in Gram Sabha meetings.
	No	6	
MGNREGA should be continued	Yes	100	All beneficiaries (the majority were women) wanted the scheme to continue.
	No	Zero	
Source of Data: Field Survey, 2025			

In reality, the demand-driven aspect of MGNREGS is not very strong. Only 11 per cent of respondents reported receiving employment when demanded, and the same proportion received employment within the mandated 15-day period. For most workers, employment generation depended largely on the availability of work rather than formal demand, reducing the scheme's effectiveness as a legal employment guarantee. Worksite accessibility emerges as a major implementation concern. Only 21 per cent of respondents reported receiving work within 5 km of their village, while 79 per cent were required to travel beyond the prescribed distance. Active workers often travelled longer distances to secure employment, increasing physical strain and time costs, particularly for women workers. Individual asset creation under MGNREGS was reported by only 6 per cent of respondents, mainly in the form of PMAY-related assets and cattle sheds. Although the proportion of households benefiting from asset creation is low, all respondents who reported asset creation considered these assets sustainable, showing satisfactory construction quality.

In terms of satisfaction, 94 per cent of respondents were satisfied with the nature of the work provided, while dissatisfaction was primarily related to inadequate worksite facilities. Only 13 per cent reported satisfaction with worksite facilities, highlighting the poor availability of basic amenities such as drinking water, shade, and rest areas. The data also reveals cases of discrimination in access to work. About 16 per cent of respondents reported experiencing discrimination, particularly from coworkers in the allocation of work. Such practices undermine the scheme's broader intent and affect equitable access to employment.

Awareness and access to unemployment allowance remain negligible. None of the respondents reported receiving unemployment allowance, and the majority had never heard about this entitlement. Similarly, no respondent received a travel allowance despite widespread engagement at worksites located more than 5 km away, indicating a clear violation of the scheme's provisions. All beneficiaries' bank accounts were found to be linked to Aadhaar Card for Direct Benefit Transfer (DBT). All respondents reported normal working hours for their work in the scheme.

Delays in wage payment remain a significant issue for workers. A significant 89 per cent of respondents reported delays in wage payments, which adversely affected household financial stability and pushed workers into debt. Despite statutory provisions, none of the respondents received interest on delayed payments,

which further reduced their income security under the scheme. Most respondents (85 per cent) reported facing problems during work, reflecting multiple implementation challenges. At the same time, social audit and Gram Sabha participation were reported to be relatively high, suggesting the presence of formal accountability mechanisms. However, their effectiveness in resolving worker complaints appears limited.

Even with these challenges, the findings indicate strong support among respondents for the continuation of MGNREGS. The scheme remains a crucial source of livelihood support, particularly for women workers, highlighting its importance despite persistent implementation gaps.

Conclusion

The present study examined the performance of the Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) among Scheduled Caste households in Fatehabad district of Haryana. The findings clearly show that MGNREGS plays a significant role in providing wage employment and income support to economically vulnerable SC households, particularly women, who constitute the majority of beneficiaries. The scheme acts as an important livelihood support mechanism in the district. However, the study reveals that the scheme has failed to achieve its core objective of providing 100 days of guaranteed employment for most surveyed households. A large majority of respondents received fewer than 50 days of work in a year, reflecting serious supply-side and implementation gaps. Similar patterns of limited work availability have also been observed in earlier studies, suggesting that this remains a persistent challenge in the effective functioning of MGNREGS. The income earned through the scheme is low, with nearly half of beneficiaries earning below 10,000 annually. This implies that while MGNREGS helps reduce economic distress, it serves mainly as a supplementary source of income rather than a sustainable livelihood option, which supports previous research on the scheme. The study also highlights that most workers are engaged in cleaning irrigation channels and ponds, which contribute to local asset creation and natural resource conservation. These works have long-term benefits for rural communities. Women's participation under the scheme is high, reflecting its importance for women's economic inclusion. However, women workers continue to face challenges such as long worksite distances, the absence of a travel allowance, physical strain, and limited awareness of their rights under the scheme.

Based on the findings, the study suggests several policy implications. First, there is an urgent need to strengthen planning and the timely approval of work at the Panchayat level to ensure year-round employment. Second, work should be provided within the prescribed 5 km radius, and travel allowance must be strictly implemented where this is not possible. Third, awareness campaigns should be conducted regularly to educate SC workers, especially women, about their rights, wage entitlements, and worksite facilities under MGNREGS. Finally, stronger monitoring and accountability mechanisms are required to reduce implementation gaps and improve the scheme's overall effectiveness in the study area.

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Stride in Women Empowerment, But Miles to Go: A Status of Women in Bihar

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Abstract
Societal progress hinges on increasing women's empowerment and autonomy, yet gender equality remains a challenge worldwide. India ranks 131st out of 188 countries on the gender disparity index, highlighting ongoing gaps. In Bihar, women's autonomy is the lowest according to the National Family Health Survey-5. Nevertheless, the Bihar government continues to empower women by reserving 33% to 50% of seats in local governance and employment, and by supporting one million self-help groups through the Jeevika program. This study analysed the autonomy of 4,636 currently married women aged 15-49 in Bihar, utilising NFHS data and spatial analysis. The results show that over half of the women experience moderate freedom of movement, such as visiting markets and health facilities without permission, and more than three-fourths participate in household decision-making. Districts like Nalanda, Seikhpura, Lakhisarai, Banka, Gaya, Patna and Aurangabad demonstrate the highest levels of autonomy, although notable regional disparities persist across Bihar.
***Keywords*:** Household, freedom, autonomy, decision-making, Bihar

Introduction

Despite global progress, it is widely acknowledged that few societies offer women the same status as men (Khan & Ram, 2009). Empirically, it is evident that societal growth depends on increased empowerment and autonomy for women. Autonomy is defined as a person's ability to self-govern, act independently, and make informed decisions. A woman's autonomy is defined as her ability to make independent decisions, control over her life, and the degree to which she and her family have an equal voice with their husbands in matters affecting them, control over material and other resources, access to knowledge and information, and the ability to create equitable power relationships within families (Jejeebhoy & Sathar, 2001). Research conducted globally on women's autonomy demonstrates that it is associated with many outcome variables. The work of Akram (2018), Akhtar et al. (2019), and Jejeebhoy & Sathar (2001) on Pakistan showed that it has a female population; however, women have less decision-making power. Men rule, and women face social, cultural, and economic inequalities. This multifaceted concept includes the flexibility to make decisions across numerous areas of

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life based on perceived information and the ability to judge one's own problems. Age, Education, occupation, and economic situations all influence women's autonomy (Patel et al., 2022).

Moreover, age, employment, marriage, and the number of living children increase women's decision-making autonomy. Marriage increases autonomy, supporting Ogbu's notion that bride wealth improves women's standing. Bride wealth gives women greater autonomy in Sub-Saharan Africa (Asaouli et al., 2018). In 1997, Mason briefly examined the family correlates of women's autonomy and power in South and Southeast Asia, using carefully gathered data from over five dozen groups in Pakistan, India, Malaysia, Thailand, and the Philippines, and found that traditional family patterns and gender norms give married women little economic decision-making power, whereas the trust and experience gained through many years of marriage and the power gained from living as the household head's wife tend to give her a greater voice in financial decisions (Mason, K.O., 1997). Education and employment are important in determining women's input into financial decisions, but they are largely irrelevant to social and organisational decisions in Sri Lanka (Malhotra & Mather, 1997). Decision-making has been considered the most important contributor to women's autonomy and empowerment (Kabir & Jahan, 2013), a finding that holds in a traditional society like India, where men have been the predominant decision-makers. Another study on Indian women by Allendorf (2012) suggests that positive aspects of family relationship quality do influence women's lives. The strength of family bonds, especially marital bonds, plays an important role in determining women's ability to make decisions within the family. Studies conducted in India showed that behaviour and regional standards affect women's autonomy. Women's autonomy has been captured across various dimensions, offering a glimpse into the dim picture of women's autonomy in high-focus states in India (Patel et al., 2022).

In the context of India, the country falls in the medium category on the gender disparity index, ranking 131 out of 188 nations (The United Nations Development Program's Human Development Report, 2016). This country is attributed with diversity in the economic and social spheres, but also in gender inequality and inequity, leading to poor status and social injustice towards women. A study by Kabir & Jahan (2013) finds that males are predominantly decision-makers. However, another study showed that behaviour and regional standards affect women's autonomy. According to Dyson & Moore (1983) and Jejeebhoy & Sathar 2001), compared to the social structures of the north, women in the southern region have greater access to the outside world, greater freedom of movement, and greater voice in family life. South Indian women have high autonomy, while north Indian women have low autonomy. Southern women are more likely to adopt innovative techniques of reproductive control, remain more active in the labour force, and use health services for both themselves and their children.

Acharya et al. (2010) found a clear correlation between age and women's decision-making regarding healthcare, home purchases, and visits to friends and family. The practice of marriage and the age at which it is entered into among males and females have a direct bearing on several social and demographic outcomes. According to Jan and Akhtar (2008), for the smooth running of a family, equal status and equal power must be given to both males and females. A study by Monika

Gupta observed that older ladies and men both have authority over young wives in the home. Later in life, northern Indian women can express their biological advantage in survival and obtain autonomy. Age therefore plays a significant role in decision-making (Gupta, M.D., 1995).

Girls' education and employment are crucial for women's empowerment, providing women with the freedom to make their own decisions (Shetty & Hans, 2019). Education and employment delay early marriage, support career planning, and increase knowledge of birth control options. In 1991, Rutenberg et al. studied 25 developing nations and found that women with only a primary education were more likely to use contraception than those with no education. Women with educated husbands had greater decision-making autonomy (Idris et al., 2023). According to the District Level Health Survey Report (DLHS), women's education strongly influences reproductive health care, contraceptive behaviour, and fertility. More than half (51.8 per cent) of ever-married women in rural areas are either non-literate or literate but did not attend school, compared with 25.5 per cent among urban women. There is a clear rural-urban divide in the educational attainment of ever-married women, with 55.8 per cent of rural women non-literate, compared with 27.8 per cent of urban women. Among ever-married women in urban areas, 24.2 per cent have at least 11 years of schooling, whereas only 6 per cent of women in rural areas have the opportunity to spend 11 or more years in school (DLHS-3, 2007-08). Women are often excluded from many home decision-making processes because of their lack of education and employment. Women's employment and education have consistently had a favourable influence on decision-making, as widely documented (Yadav et al., 2019). Moreover, Sathar and Kazi (2000) underscored that wealthy and educated women are more aware of and in control of their health than their less fortunate and uneducated peers.

Although marriage is the most important family event in India and the choice of a life partner is a pivotal decision with a significant impact on women's autonomy (Banerjee & Deshpande, 2020), women should feel settled, secure, respected, complete, and confident in marriage. This indicates that Indian women's standing revolves around marriage (Biswas & Mukhopadhyay, 2018). Research by Shireen et al. on marriage-related decision-making shows that family-arranged marriages are still very common in India. However, semi-arranged marriages, in which the young woman has some say in the decision-making process, are also prevalent (Shireen et al., 2013). Women whose marriage is self-choice have the most decision-making authority. However, power relations between women, husbands, and in-laws are complex. 'Some-choice' marriages strengthen husbands, while 'no-choice' marriages benefit the parents-in-law (Banerjee & Deshpande, 2020). Jan and Akhtar (2008) analysed the decision-making power of married and unmarried women and found that women in families have limited decision-making authority. The study concluded that having a say in selecting a spouse was significantly correlated with agreement with the spouse over the number of children to have, intention to use contraception, and the time between marriage and the first contraceptive use (Hamid et al., 2011). Khan and Ram examined how women's autonomy relates to their ability to move about the outside world, their access to financial resources, their participation in domestic decision-making, and their use of contraception and fertility (Khan & Ram, 2009). Early-married women are less likely

to defer their first pregnancy with contraception. This may be due to the significant pressures most young Indian women feel to establish their fertility soon after marriage and the limited contact with the health care system they have before parenthood (Sather et al., 2010).

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Additionally, studies show a dim picture of women's autonomy in high-focus states of India; Bihar exhibits the lowest level of women's autonomy (6.4%) as per NFHS-4 (Patel et al., 2022). However, the Government of Bihar is continuously working toward holistic development and empowering women. Hence, the state has unanimously approved 33% to 50% Women's reservation in local governance and jobs (Kumari, 2023). Also, Bihar facilitates the setup of the highest number (10 lakhs) of self-help groups (SHGs) supported by Jeevika, a World Bank-supported poverty alleviation programme operational in the state since 2007 (Kumar, 2020). Numerous other schemes, including the Chief Minister's Women Entrepreneur Scheme, Chief Minister's Kanya Uthan Yojana, Chief Minister's Balika Protsahan Yojana, Janani Bal Suraksha Yojana, and Chief Minister's Kanya Vivah Yojana, among others, have successfully transformed the landscape of women's lives in Bihar. Through these schemes and initiatives, the Bihar government has made notable strides in involving women in nation-building. However, amid these efforts, Padam Shri recipient and social activist Sudha Varghese stressed the need for a "composite scheme" for women's empowerment; otherwise, those who are already capable will only benefit from the government quota and all.

Research Questions

1. Which autonomy indicators have improved over time in favour of women?
2. Spatially, which women from which part of Bihar enjoy more autonomy?
3. What are the main factors and correlates of women's autonomy that need to be focused on to improve?

Objectives

1. To quantify and analyse the level of autonomy among currently married women aged 15-49 years.
2. To identify and spatially represent the variations in women's autonomy across different districts of Bihar.

Data and Methods

Data Source

This study utilises the third, fourth and fifth rounds of data from the National Family Health Survey (NFHS-5), conducted by the Ministry of Health and Family Welfare (MoHFW) of the Government of India. The NFHS-5 is an open-source, cross-sectional survey managed by the International Institute for Population Sciences (IIPS). The survey collects comprehensive data on various demographic, socio-economic,

maternal health, women empowerment, family planning, and fertility issues. The NFHS-5 dataset is publicly accessible, ensuring transparency and enabling reproducibility of the research findings.

Study Population

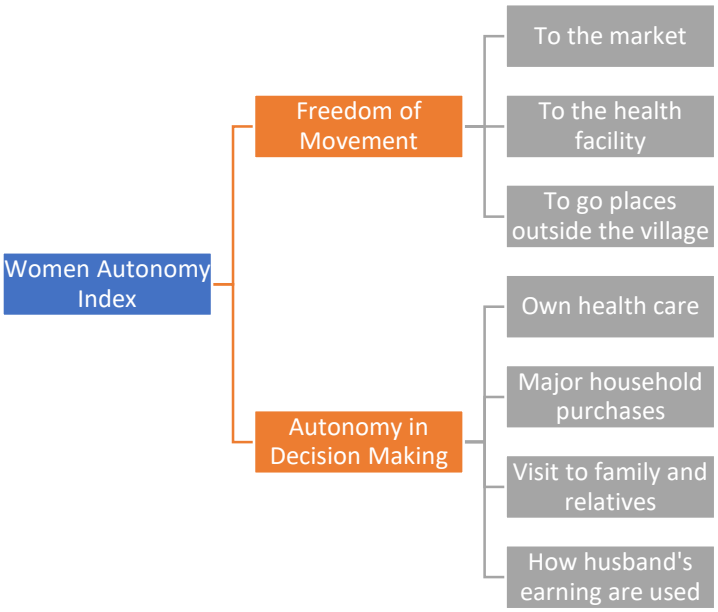
The sample for this study comprises 4,636 currently married women aged 15-49 years (NFHS-5) from the state of Bihar, India. This specific demography was selected to focus on married women's autonomy within the household and community, given their unique social and cultural contexts.

Variables and Domains

To assess women's autonomy, seven variables from the NFHS-5 data were selected and categorised into two domains: Freedom of Movement and Autonomy in Decision Making (Figure1). Each of these variables was dichotomised, with 0 indicating a lack of support for women's autonomy and 1 indicating support for women's autonomy.

Figure 1

Flowchart Showing Domains and Variables Used to Create Women's Autonomy Index



(Constructed by Authors)

Freedom of Movement: This domain includes three variables:

- Ability to go to the market.
- Ability to visit the health facility.
- Ability to go places outside the village

Autonomy in Decision Making: This domain includes four variables:

- Decision on own health care.
- Decision on major household purchases.
- Decision on visits to family or relatives.
- Decision on daily household purchases.

Composite Index Construction Methodology

To quantify women's autonomy, two indices were constructed: The Freedom of Movement Index (FMI) and the Autonomy in Decision Making Index (DMI). These indices were then combined to create an overall Women's Autonomy Index (WAI).

1. *Freedom of Movement Index (FMI):* To construct the composite FMI, the three relevant variables were summed. The FMI was then calculated using the following formula:

   FMI=
   (Actual Value−Minimum Value)/
   (Maximum Value−Minimum Value)
   This formula standardises the index, ensuring it ranges from 0 to 1, where 0 signifies no freedom of movement and 1 signifies full freedom of movement.

2. *Autonomy in Decision Making Index (DMI):* Similarly, the DMI was created by summing the four relevant variables. The DMI was then calculated using the same standardisation formula:

   DMI= (Actual Value−Minimum Value) / (Maximum Value−Minimum Value)

3. *Women's Autonomy Index (WAI):* The mean of the FMI and DMI was calculated to derive the WAI:

   WAI= (FMI+DMI) / 2

The WAI provides an overall measure of women's autonomy, ranging from 0 to 1, where 0 indicates no or minimal autonomy and 1 indicates full autonomy.

Spatial Analysis. To spatially visualise women's autonomy across districts in Bihar, district-wise choropleth maps were created for each index (FMI, DMI, and WAI). These maps visually represent the variation in women's autonomy within the state, highlighting areas with differing levels of autonomy.

Statistical Analysis. Descriptive statistics were used to summarise the demographic characteristics of the study population. The indices (FMI, DMI, and WAI) were calculated for each respondent, and the mean values were analysed at the district level. Spatial analysis was performed using ArcGIS software to create choropleth maps, providing a visual representation of women's autonomy across regions. Bivariate and multivariate analyses were also conducted to examine associations between women's autonomy and their socio-economic and demographic characteristics in Stata 16.1.

Findings

Table 1

Stride in Women Empowerment in Bihar (NFHS-3, 4 & 5)

Women's Empowerment	**Total**	**Urban**	**Rural**
NFHS-3 (2005-06)			
Household decisions making	46.3	49.8	45.7
Allowed to go alone/ Freedom of movement	25.2	NA	NA
NFHS-4 (2015-16)			
Household decisions making	51.8	58.8	50.7
Allowed to go alone/ Freedom of movement	33.8	40.2	43.7
NFHS-5 (2019-21)			
Household decisions making	71	68.3	71.6
Allowed to go alone/ Freedom of movement	43.2	45	42.8
Source: NFHS-3 (2005-06), NFHS-4 (2015-16), & NFHS-5 (2019-21), N= 4,636			
Note: Household decision-making includes decisions on Own health care, Major Household Purchases, and visits to family and relatives. **Allowed to go/freedom of movement includes**: allowed to go to the market, to the health facility and allowed to visit places outside the village and community.			

India is striving to achieve Sustainable Development Goal 5, which focuses on women's empowerment and gender equality by 2030. To measure women's progress in Bihar, trends in women's empowerment over time are examined, focusing on two specific areas: household decision-making and freedom of movement. Table 1 shows interesting insights on women's progress over the last two decades. There has been a noticeable increase in women's participation in household decision-making from NFHS-3 to NFHS-5. The total percentage of women involved in decision-making rose from 46.3% to 71% over this period. Urban areas saw a significant increase, though rural areas had a slightly higher percentage of women involved in decision-making than urban areas in the most recent survey. There has been an improvement in women's freedom of movement, with the percentage rising from 25.2% to 43.2% between NFHS-3 and NFHS-5. Urban women experienced a significant improvement, while rural women's freedom of movement was relatively high and stable across the surveys. Overall, the data show positive trends in women's empowerment in both domains. The progress, particularly in household decision-making, indicates significant strides towards gender equality, though there is still room for improvement, especially in freedom of movement.

Freedom of Mobility. In NFHS-5, freedom of mobility for women is assessed by examining whether they are usually allowed to go alone to places such as markets, health facilities, or outside their village or community. This definition focuses on whether women have the permission to move independently, rather than their ability to make independent decisions about mobility.

Figure 2 illustrates the freedom of movement among women in Bihar. It gives a snapshot of the women's ability to travel independently to various locations. The study's analysis shows that the highest mobility is observed for going to the market, followed by visiting health facilities and travelling outside the village. These figures indicate a moderate level of mobility autonomy among women in the state. The lower percentages for travelling outside the village and to healthcare facilities might indicate specific barriers, such as transportation difficulties, safety concerns, or social norms that restrict women's movement. The data reflect general trends but may vary significantly between urban and rural areas. Rural women might face more substantial challenges compared to their urban counterparts.

Figure 2

Percentage of Women Allowed to Go Alone/Freedom of Movement, NFHS-5

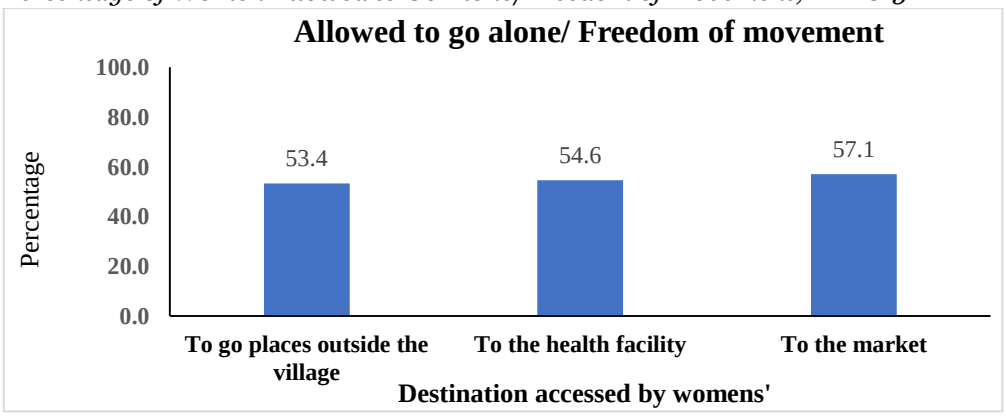


Figure 3

Spatial Pattern of Freedom of Movement in Bihar, NFHS-5

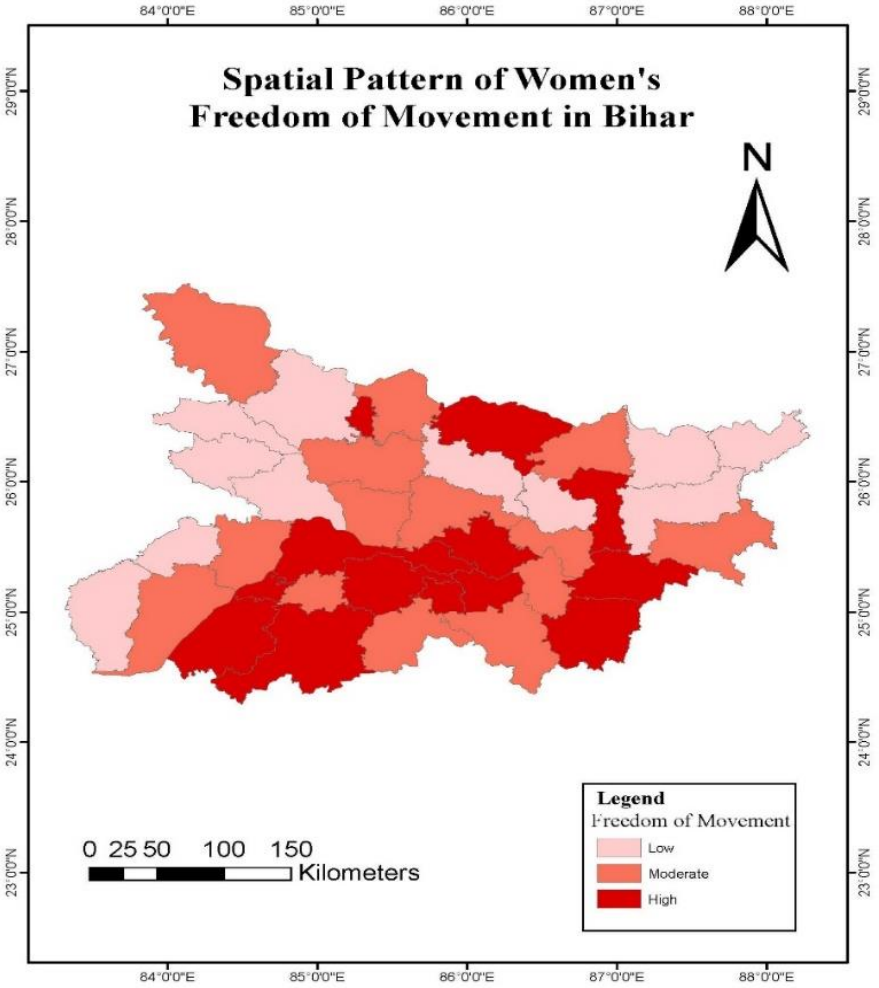


Figure 3 examines women's autonomy in terms of mobility. Districts such as Aurangabad, Gaya, Arwal, Patna, Nalanda, Lakhisarai, Banka, Bhagalpur, Madhepura, Madhubani, and Seohar exhibit high mobility. Districts like W. Champaran, Sitamarhi, Supaul, Muzaffarpur, Vaishali, Samastipur, Rohtas, Bhojpur, Jamui, Nawada, and Katihar are categorised as having moderate mobility autonomy. In contrast, districts such as E. Champaran, Siwan, Gopalganj, Araria, Kishanganj, Kaimur, Buxar, and Purnia have very low mobility autonomy.

Level of Autonomy in Decision Making

NFHS-5 data indicates a positive trend in women's decision-making autonomy within households, particularly concerning healthcare, major purchases, and family visits. While a significant percentage of women participate in these decisions, it is crucial to acknowledge that this does not always equate to complete control.

Figure 4
Graph Showing the Household Decision Making by Females in Bihar, NFHS-5

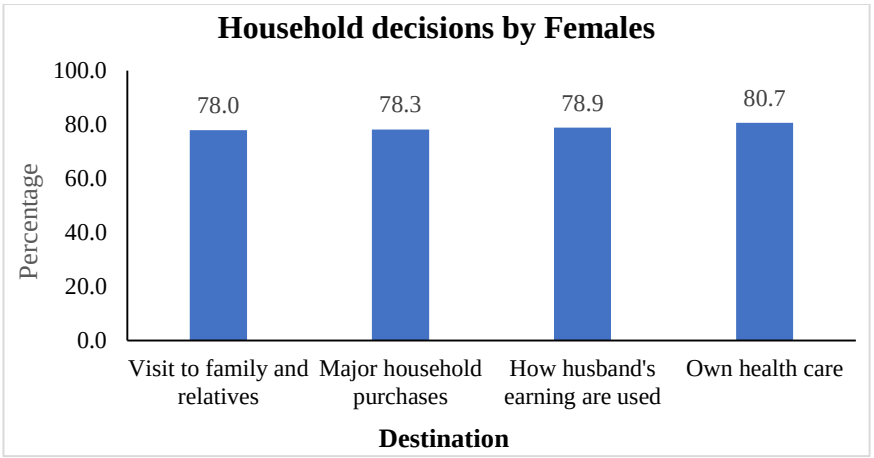


Figure 4 highlights women's say in household decision-making, revealing the extent to which women in Bihar are involved in various decisions within their households. The high percentages across all decision-making categories reflect a positive trend towards women's empowerment in household affairs. Women in Bihar appear to have considerable influence over key aspects of household management and personal health. Involvement in decisions about visiting family (78%), major purchases (78.3%), and financial matters (78.9%) is relatively consistent, indicating a balanced distribution of decision-making power in these areas. The slightly higher percentage for decisions related to their own health care (80.7%) suggests a particular focus on personal well-being, which may be attributed to the critical nature of such decisions.

A district-wise analysis of women's autonomy in decision-making across Bihar was conducted (see Figure 5). The districts of Sitamarhi, Madhubani, Supaul, Araria, Madhepura, Muzaffarpur, Gopalganj, and Siwan in the north, and Gaya in the south, exhibit high autonomy. Districts such as East Champaran, Kishanganj, Purnia, Katihar, Bhagalpur, and Banka fall into the moderate category. Conversely, western and southern districts such as Kaimur, Rohtas, Buxar, Patna, Jehanabad, and Begusarai exhibit low autonomy.

Overall Women Autonomy in Bihar

Figure 6 combines the variables of freedom of movement and decision-making to analyse women's overall autonomy. In North Bihar, districts such as Sheohar, Madhubani, Supaul, Madhepura, Vaishali, and Begusarai exhibit high levels of women's autonomy. In South Bihar, Nalanda, Seikhpura, Lakhisarai, Banka, Gaya, and Aurangabad show the highest autonomy. Moderate autonomy is observed in districts such as W. Champaran, Sitamarhi, Muzaffarpur, Araria, Siwan, Katihar, Bhagalpur, Jamui, Nawada, and Patna. On the other hand, districts such as E. Champaran, Gopalganj, Saran, Darbhanga, Saharsa, Purnia, Kishanganj, Munger, Arwal, Kaimur, Rohtas, Buxar, and Bhojpur fall into the low-autonomy category.

Figure 5

Spatial Pattern of Women's Autonomy of Decision Making in Bihar, NFHS-5

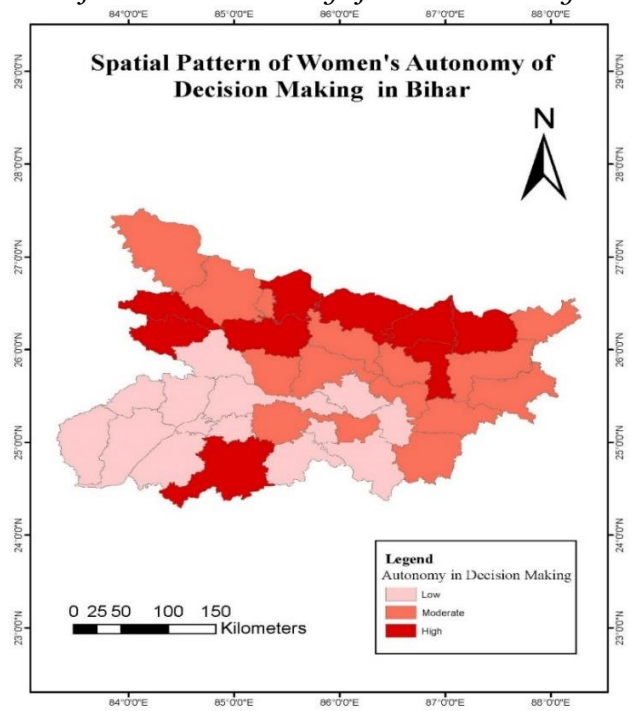


Figure 6

Spatial Pattern of Women's Autonomy in Bihar, NFHS-5

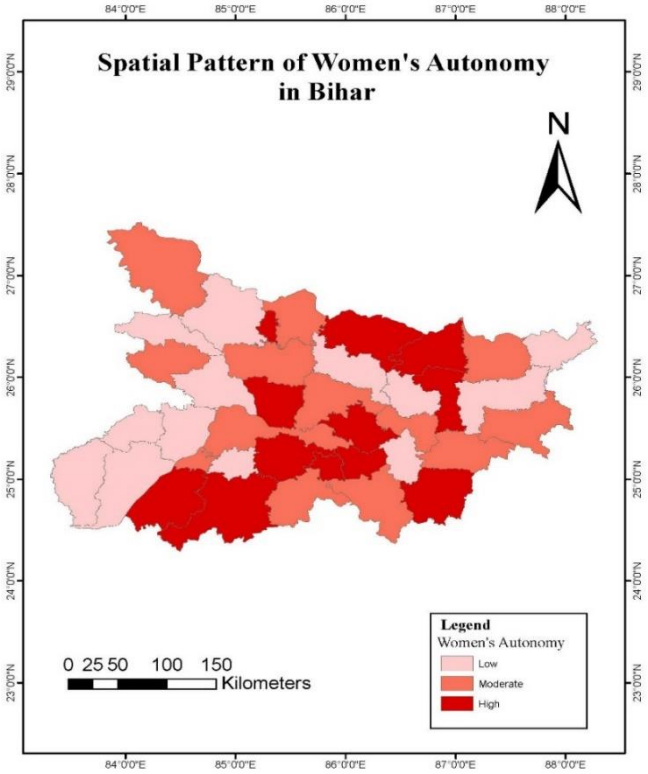


Table 2
Adjusted Odds Ratio for Women's Autonomy by Selected Background Characteristics in Bihar

Women's Autonomy Indicators	Odds Ratio	Std. Err.	[95% Conf. Interval]	
Age Group (Ref: 15-59)				
20-24	1.6907***	0.2632417	1.24607	2.294048
25-29	2.9698***	0.4594911	2.19291	4.021816
30-34	4.2099***	0.6796255	3.067978	5.776736
35-39	5.0422***	0.8232961	3.661286	6.943918
40-44	5.9345***	1.013958	4.245722	8.295066
45-49	6.7191***	1.181707	4.759971	9.484459
Place of Residence (Ref: Urban)				
Rural	0.7311***	0.0781629	0.5929047	0.9015448
Educational Status (Ref: literate)				
Primary	0.941	0.0950705	0.7719366	1.147046
Secondary	0.8226**	0.0673098	0.7007486	0.9657306
Higher	1.049	0.1578491	0.7807722	1.408544
Currently Working (Ref: no)				
Yes	1.7809***	0.1702782	1.476599	2.14799
Wealth Quantile (Ref: Poorest)				
Poorer	0.8145**	0.0639707	0.6983352	0.9500872
Middle	0.8304*	0.0818315	0.6845729	1.007345
Richer	0.5400***	0.0673405	0.4228784	0.6894848
Richest	0.927	0.1718337	0.6445677	1.333061
Religion (Ref: Hindu)				
Muslim	1.0394	0.0919895	0.8738255	1.236229
Others	0.4116	0.3101594	0.0939626	1.802661
Source: National Family Health Survey (NFHS-5) (2019-2021) N=4,636 sample				

The analysis shows that women's autonomy increases significantly with age (see Table 2). As women age, they are increasingly likely to exhibit greater autonomy. This positive trend indicates that, with increasing age, women gain more autonomy, likely due to greater experience, social standing, and confidence in decision-making. Place of residence significantly determines women's autonomy. Women living in rural areas have 0.73 times the odds of higher autonomy compared with those in urban areas.

Educational status shows mixed effects on women's autonomy. Women with secondary education have lower odds (18%) of having autonomy compared to illiterate women. However, primary and higher education do not differ significantly.

Employment status plays a strong factor influencing women's autonomy. Women who are currently employed are

significantly more likely to have greater autonomy than those who are not working. Employment provides women with financial independence, social networks, and a sense of empowerment, which contribute to higher autonomy.

Wealth status influences women's autonomy in varied ways. Women in the poorer quintile are less likely to have high autonomy than those in the poorest quintile. The middle quintile shows a marginally significant decrease in autonomy, while the richer quintile shows a significant decrease. The richest quintile does not differ significantly from the poorest quintile. These results suggest that women at different ends of the wealth spectrum face distinct challenges to their autonomy, such as financial instability among the poor and, among the wealthy, possibly restrictive norms.

Religion does not significantly affect women's autonomy in Bihar. There are no notable differences between Hindu women and the Muslim or other religious counterparts. This indicates that in the context of Bihar, other socio-economic and demographic factors play a more critical role in determining women's autonomy than religious affiliation.

The findings highlight the multifaceted nature of women's autonomy in Bihar, influenced by age, residence, employment status, and wealth. Older women, urban residents, and employed women tend to have higher autonomy. The relationship with education and wealth is more complex, suggesting that broader socio-economic and cultural dynamics play a critical role. These insights underscore the need for targeted interventions to enhance women's autonomy, particularly in rural areas, through employment opportunities and the reduction of socio-economic disparities.

Discussion

The analysis reveals significant geographical variations in women's autonomy across Bihar. In terms of decision-making power, women in the northern and eastern parts of Bihar have a greater say in their households. According to the Population Reference Bureau (2011), this region has the highest proportion of women who have completed 10 years of schooling, which may explain greater autonomy in women's decision-making. It is also evident that women in Patna, considered one of the most urbanised and developed districts of Bihar, hold a lower position in decision-making power. Women in districts adjoining the state of Jharkhand (except Gaya and Banka) rank lowest in decision-making power. This may be attributed to the tribal culture prevailing in this area. Additionally, low autonomy in decision-making in these areas is due to patriarchal ideology, which limits women's power in decision-making (Pandey et al., 2021).

However, the scenario changes when looking at women's freedom of movement. Freedom of movement is integral to women's empowerment (Mehta & Sai, 2021). The southern part of Bihar is in better condition than the northern part. This may be attributed to the higher literacy rate prevailing in south Bihar than in north Bihar (Census 1991-2011, NFHS-4). Overall, women's autonomy in Bihar is higher in the central region, where the river Ganges flows, and this gradually has a spillover effect on other areas of the state.

These differences in women's autonomy can be attributed to various factors (Patel et al., 2022). Some of these factors have been looked upon in our analysis. The significant increase in autonomy with age suggests that older women may have greater decision-making power and freedom of movement than younger women. This could be

attributed to accumulated experience and social standing within the household and community over time.

Rural women have lower odds of autonomy than urban women, highlighting the disparity in empowerment between these areas. Urban women might have better access to education, employment opportunities, and social networks that support their autonomy. This finding aligns with existing literature emphasising the role of urbanisation in enhancing women's empowerment. Educational status also plays a crucial role, with secondary education associated with lower odds of autonomy than illiteracy. This counterintuitive finding may reflect the complexities of social and cultural norms that still restrict women's autonomy despite educational attainment. However, the positive impact of employment on women's autonomy underscores the importance of economic independence in empowering women.

The analysis also shows that wealthier women do not necessarily have greater autonomy than the poorest women, which may reflect entrenched social norms and patriarchal structures that constrain women's decision-making power regardless of economic status. The absence of significant differences in autonomy by religion suggests that cultural and religious factors may be less influential than socio-economic factors in shaping women's autonomy in Bihar.

These findings align with research by Pandey et al. (2021), which indicates that women's education and occupational status are significantly correlated with their empowerment and involvement in decision-making. The Bihar Gender Report Card (2019) also supports the observation that socio-economic status, residence, and occupation influence women's mobility and overall autonomy.

Conclusion

Despite increased education and economic opportunities, traditional gender stereotypes still limit women's decision-making power. The state's stance is complex; although urbanisation is often linked to economic and social progress, it does not automatically lead to empowerment for all, especially women. In Bihar, the southern region is relatively better off than the northern part. It is essential to examine how education acts as a catalyst for social transformation. The study emphasises how geographic and economic factors influence social dynamics. This research will help in understanding the complex interplay between these elements, showing that economic status alone is not a sufficient predictor of women's empowerment. Addressing both economic and social factors is crucial for achieving genuine autonomy.

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Examining the Association Between Socio-Demographic Variables and Fertility-Related Decision-Making Autonomy Among Muslim Women at Mathurapur-I CD Block, Indian Sundarbans

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Abstract

Fertility influences population size and structure, with women's autonomy closely linked to fertility behaviour. This study examines fertility behaviour and autonomy among Muslim women in Mathurapur-I, Indian Sundarbans. Using cluster and purposive sampling, 100 married Muslim women aged 15–49 were surveyed through face-to-face interviews. Data on socio-demographics, fertility behaviour, and autonomy were collected. Techniques included descriptive analysis, chi-square tests, and binary logistic regression. Findings show that respondents' age, age at marriage, and age at first birth are significantly related to fertility. Women's current age, family type, work participation, and family headship affect contraceptive use. Additionally, women's age and husband's education positively influence decisions on the first child.

Keywords: Fertility status, fertility-related autonomy, Muslim women, Indian Sundarbans

Introduction

Fertility behaviour refers to the childbearing patterns of women or couples. According to the 2011 census, Muslims are the largest minority community in India, accounting for around 14.22 per cent of the total population. Among them, Muslim women make up 6. 93 per cent, which is higher than the female population in many Islamic countries. As per the NFHS-5 report, the total fertility rate in India is 2.0, and in West Bengal it is 1.16, both below the replacement level (2.1). Women in rural areas have higher fertility rates than those in urban areas. Yadava and Yadava (1999) highlighted the relationship between women's status and fertility in India, finding that high fertility was associated with women of lower socio-economic status, and vice versa. They also reported an inverse relationship between women's decision-making autonomy and fertility behaviour. Dharmalingam and Morgan (2004) reported that Muslims are much more likely than Hindus to desire more children and less likely to use contraceptive

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methods. Rai et al. (2014) found that gender preference influences fertility and reproductive behaviour of respondents and emphasised the need to reduce son preference to improve the health and well-being of women and children. Ghose (2018) pointed out in his paper that the fertility transition in India has been steady over the past decade. While both Hindus and Muslims have undergone this transition at different rates, Muslim fertility has been higher than that of Hindus at the regional level. Islam and Siddiqui (2016) examined the educational status of Muslim women in Malda district, West Bengal, highlighting significant disparities in literacy rates compared with the broader female population in the state. The study revealed that Muslim women experienced greater educational disadvantages than non-Muslim women, with the key contributing factors including poverty, domestic responsibilities, son preference, and early marriage. Bhandari et al. (2016) explored women's autonomy and its influencing factors in the Kapilvastu District of Nepal based on a primary survey. They found that women's education, husbands' education, and household economic status were strongly associated with women's autonomy.

Sanu (2018) highlighted that Muslim women are relatively more disadvantaged and occupy a lower socio-economic status than women from other communities in India. The study also found greater disparities in their educational attainment, access to employment, and gender equality compared with other communities.

Majumder et al. (2024) have found in their study that women's decision-making autonomy is associated with the utilisation of full antenatal care services, and that women who are actively involved in decision-making are more likely to utilise these services.

However, most previous studies have sought to explain women's fertility behaviour and socio-economic conditions in India. A few studies have examined women's autonomy. There is a lack of work on fertility behaviour and fertility-related autonomy among Muslim women in rural areas and at the regional level. The present research aims to examine fertility behaviour and fertility-related autonomy among Muslim women with reference to the Mathurapur-I CD Block in the Indian Sundarbans. According to the NFHS-5 report, Muslim women's fertility rate is higher than that of women of other religions. Muslim women have 2 children, compared with Christian women, and 0.6 children more than Hindu women. What is the fertility behaviour of Muslim women in Mathurapur-I CD Block, and do they have any fertility-related autonomy? Therefore, it is a matter of concern to answer these questions in Mathurapur-I CD Block and to study the issues. Based on the literature review, two research objectives have been selected for this study.

Objectives

The objectives of the present study are as follows:

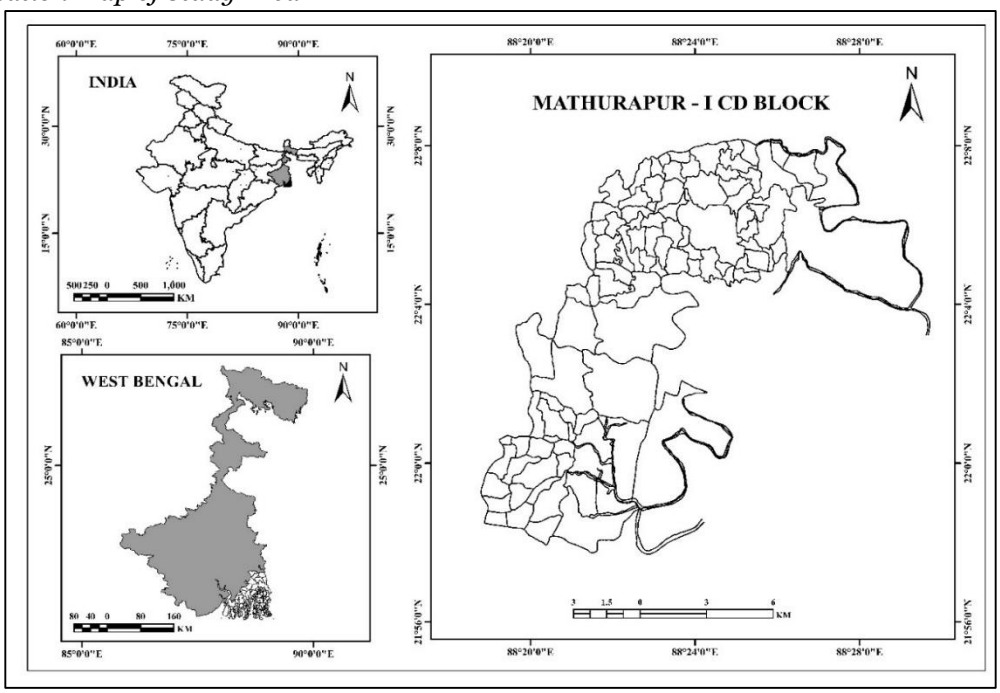
- To assess the fertility behaviour among Muslim women in Mathurapur -I CD Block.
- To analyse the fertility-related autonomy among Muslim women.

Area Identity

The Mathurapur I CD Block has been selected as the study area for scrutiny. Mathurapur I is a community development block (CD block) in the Diamond Harbour subdivision of South 24 Parganas district in West Bengal. Its geographical coordinates are 22°07' 13"North latitude and 88°02' 39"East longitude. The northern side of this block is Jayanagar II CD Block; Mathurapur II CD Block bounds the eastern side; the southern part of this block is Patharpratima CD Block; and Kulpi and Mandirbazar CD Blocks cover the western side. The total area under Mathurapur I CD Block is 147.30 30 sq. km. There are 10 Gram Panchayats and 95 villages, of which 91 are inhabited. As per

the 2011 census, the rural population is 86. 8% and the urban population is 13—2%. The population density is 1324 per sq. km. According to the 2011 census, the Muslim population in this block is 40— 41% of the block's total population. There are four census towns in this block, and the sex ratio is 949; the child sex ratio is 975, as per the 2011 census. The average literacy rate is 73. 93%, with 88. 06% male literacy and 66. 87% female literacy out of the total population; the working population is 32. 92% of the total population, and the non-working population is 67.08% of this block's total population. The male and female working populations were 53. 33% and 11.40 40% of the total male and female populations, respectively. According to NFHS-5, the total fertility rate (TFR) in West Bengal is only 1.16 children per woman, far below the replacement level. The total fertility rate is 1.14 in urban areas within the state and 1.17 in rural areas. Muslim women' s fertility rate is higher than that of women of other religions. Mathurapur- I CD Block is part of the Sundarbans region. In rural areas, what is the fertility behaviour among Muslim women, and is there any fertility- related autonomy among them? To address these questions, the present study focuses on fertility and autonomy among Muslim women in Mathurapur- I CD Block.

Figure 1
Location Map of Study Area



Methodology and Database

The research methodology comprises research design, data collection, analysis, and interpretation of results. The study draws on both primary and secondary data. Primary data were collected through a semi-structured questionnaire, observation, and interviews to assess and analyse the fertility behaviour and fertility-related decision-making autonomy of Muslim women. Secondary data were drawn from publications by the Census of India and the West Bengal Government, research reports, books, and other relevant socio-economic data, government publications, reports, and journals. SPSS 23 (Statistical Package for

the Social Sciences) and MS Excel 2019 were used to organise and analyse the data collected through the field survey. In addition, ArcGIS version 10.3 was used.

Study Design, Setting and Sampling

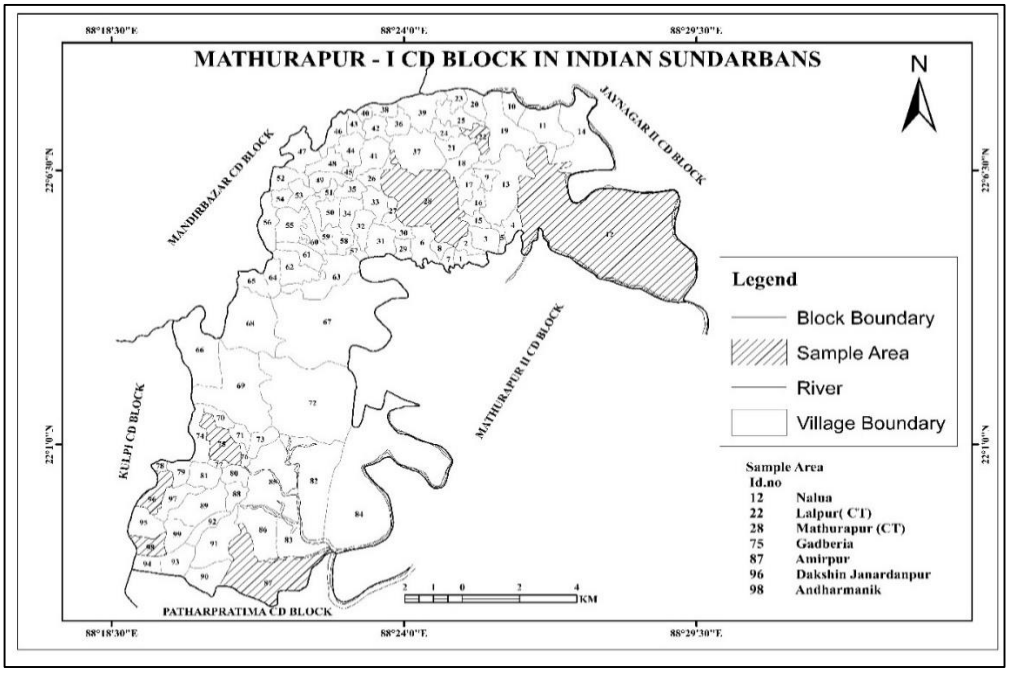
A cross-sectional study was conducted in August 2024 to analyse the fertility behaviour and fertility-related decision-making autonomy of Muslim women in the Mathurapur-I CD Block, using a semi-structured questionnaire. At the outset, a cluster sampling method was adopted to demarcate the area into suitable clusters, and purposive sampling was then used to fulfil the study's objectives. To calculate the Village Facility Index, some demographic, social, and infrastructural variables were selected from the 2011 census data. In the next step, index values for individual demographic and social variables were calculated.

Final Composite Index Score = Index score of Demographic variables + Index score of social variables+ Total weightage score of infrastructure-related variables.

After calculating the final composite index score for each village in this block, the index scores were divided into three zones: zone-I with good accessibility and better socio-economic conditions; zone-II with moderate accessibility and socio-economic conditions; and zone-III with poor accessibility and poor socio-economic conditions. Thereafter, the samples were collected randomly from these three types of zones. The target group of the study was married Muslim women aged 15-49 years. In this research, accessibility and socio-economic conditions have been considered because various socio-economic factors, such as poverty, education, awareness, occupation and empowerment, social status and caste, family structure, and social norms, influence fertility decisions and access to care. Accessibility criteria such as proximity to healthcare facilities, availability of healthcare facilities, affordability of healthcare services, and availability of roads and transportation also significantly impact fertility in rural areas.

Figure 2

Area of Sample Collection



Source: Computed by the Researcher, 2024

Data Collection and Sample Size

The total sample size of the present study is 100, collected from the three zones in Mathurapur-I CD Block. Of these, 25 samples were collected from Mathurapur and Lalpur census towns, which belong to zone-I; 40 samples were collected from Nalua and Adharmanik villages of zone-II; and the remaining were collected from zone-III. In this case, 100 married Muslim women aged 15-49 years were selected as samples from the survey area. Some data on socio-demographic and fertility-related decision-making autonomy were collected through a questionnaire survey.

Table 1

Detailed Account of Samples

Area selection criteria	Selected area	No of respondents
Good accessibility & better socio-economic condition(zone-1)	Mathurapur census town, Lalpur	25
Moderate accessibility & socio-economic condition(zone-2)	Nalua, Adharmanik	40
Poor accessibility & poor socio-economic condition(zone-3)	Amirpur, Dakshin Janardanpur, Gadberia	35
Total		100

Source: Field survey and computed by the Researcher, 2024

Statistical Analysis

The survey data have been analysed using various statistical techniques, including descriptive statistics, the Chi-square test, and Binary Logistic Regression. The Chi-square test is used to examine the relationship among Fertility, current contraceptive use, and Socio-Demographic variables. Whereas, to estimate the effect of various predictors on fertility-related autonomy (Autonomy about 1st childbirth), binary logistic regression is used.

Results and Discussion

This part consists of three sections. The first section describes the demographic and socio-economic profile of the respondents, and the second section depicts fertility behaviour among Muslim Women in the study area. The last section delineates the respondents' autonomy in fertility-related decision-making.

Demographic and Socio-Economic Profile of the Respondents

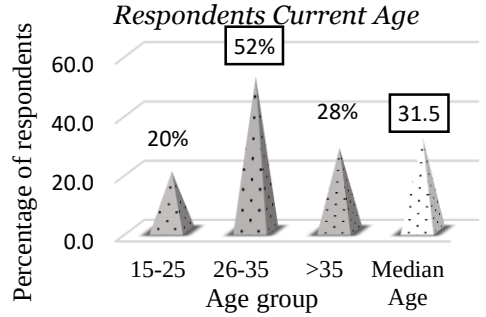
To analyse fertility behaviour among Muslim women and their fertility-related decision-making autonomy, the demographic and socio-economic profile of the respondents needs to be analysed first.

Current Age of Respondents

Among 100 respondents, 52% of women are in the 26–35-year age group, followed by 28% in the> 35-year age group and 20% in the 15–25-year age group. The median age of respondents is 31.5 years (Figure 3).

Figure 3

Respondents Current Age



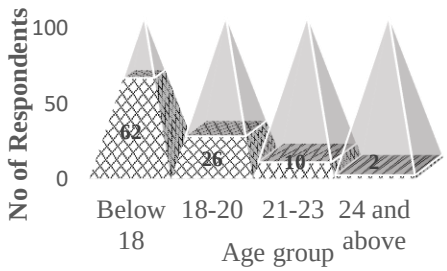
Source: Field Survey, 2024

Age at Marriage of Women

The study revealed that most respondents (62%) reported that their marriages took place before the legal age of marriage (18 years), and 26% of women married in the 18- 20-year age group. About 10% of

respondents reported that their marriages occurred when they were between 21 and 23 years old. Only 2% of respondents married at age 24 or older (Fig. 4).

Figure 4
Age at marriage of women

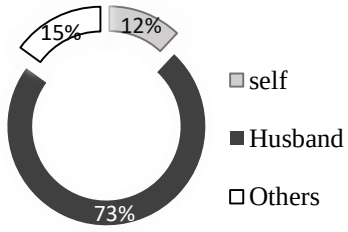


Source: Field Survey, 2024

Head of the Household

Typically, the head of the family makes most of the decisions. This may be an important factor influencing women's autonomy. Close to 73% of respondents reported that their husbands are the head of the household, and 12% of women identified themselves as the head of the household. In comparison, 15% stated that other family members are considered the head of their household.

Figure 5
Household headship of Respondents

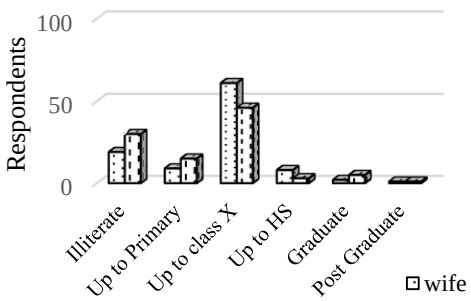


Source: Field Survey, 2024

Educational Status

Education is the basis of knowledge and awareness. Right education can bring the light of knowledge into one's life, remove the darkness of prejudice, and may be an important factor in study. It is found that 19% of women are illiterate, while a higher proportion of husbands (30%) lack basic literacy. About 9% of women and 15% of husbands have only completed up to primary education. A substantial 61% of women and 46% of men have completed up to 10th standard, which represents the highest level of education for the majority of respondents. Here, women appear to have slightly higher educational attainment in this category. Only 8% of women and 3% of men have completed their higher secondary education (12th standard), reflecting a sharp drop in educational attainment at this level. Only 2% of women and 5% of men have completed their undergraduate education, while only 1% of both women and men have post-graduate degrees.

Figure 6
Educational Status of Respondents & Their Husband



Source: Field Survey, 2024

Working Status

The primary survey (Figure 7) revealed that most respondents are housewives (76%), while only 24% are employed. Women's employment status is a crucial indicator of gender equality and women's autonomy. In this study, most women are homemakers.

Socio-Economic Class Using Wealth Index

NFHS 3 wealth index based on 27 assets and housing characteristics have been analyzed, such as, household electrification, drinking water source, type of toilet, type of flooring, type of house, type of roofing, cooking fuel, no of room, kitchen room have or do not have, mattress, pressure cooker, chair, cot/bed, table, electric fan, black and white TV and colour television, sewing machine, mobile phone, computer, refrigerator, watch or clock, bicycle, motor cycle or scooter, car, water pump, thresher, tractor. Based on the quintile index, households have been divided into five groups: the poorest, the poor, the middle, the rich, and the richest. This shows that 14 per cent of households are categorised in the poorest quintile, 29 per cent in the poor quintile, 17 per cent in the middle quintile, 20 per cent in the rich quintile, and 20 per cent in the richest quintile. Almost half of the respondents are socio-economically backward.

Table 2

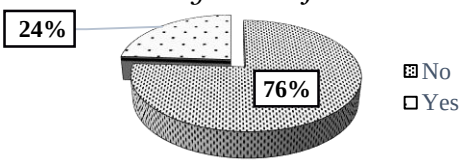
Socio-Economic Class Using Wealth Index

Wealth Index	% of households
Quintile 1 Poorest	14
Quintile 2 Poor	29
Quintile 3 Middle	17
Quintile 4 Rich	20
Quintile 5 Richest	20
Total	100

Source: Field survey and computed by the Researcher, 2024

Figure 7

Working status of women



Source: Field Survey, 2024

The socio-economic characteristics of the sample can be effectively summarised using descriptive statistics (see Table 3). The minimum respondent age is 19 years, and the maximum is 45 years. The mean age of surveyed women is 32 years, with an SD of ±6.48, indicating considerable variability in respondents' ages. The age at marriage for respondents ranges from 13 to 27 years, with a mean of 17.32 years and an SD of ±2.61. The relatively young average age at marriage suggests that early marriage may be common within this sample. By contrast, the average age of respondents' husbands is 36 years, markedly higher than that of respondents. The SD (±7.12) indicates a broad age range among respondents' husbands. In this study, family size ranges from 2 to 15 members, with a mean of 5.24 and an SD of 2.07, indicating that most respondents come from moderately large families and that family size varies notably. The average monthly family income has a mean of 14830 and a standard deviation of 6430.75. The study revealed significant income disparity within the sample. The average educational attainment of respondents is 7th standard, with an SD of 4.15, indicating a wide variation in educational levels. Husbands' educational attainment averages 5th standard, lower than that of the respondents. Only 1% of husbands have postgraduate education, while 30% of respondents' husbands are illiterate.

Table 3
Descriptive Statistics on Socio-Demographic Characteristics of Respondents

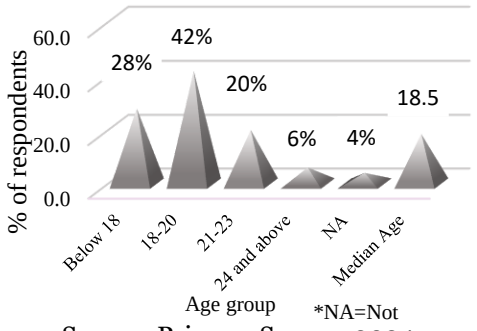
Variables	Min.	Max.	Mean	SD
Respondent's Current Age (Year)	19	45	31.69	6.48
Age at the time of Marriage of Respondent (year)	13	27	17.32	2.61
Husband's Current Age (Year)	22	55	36.26	7.120
Family Size	2	15	5.24	2.07
Monthly Income	5000	36000	14830	6430.75
Respondent's Educational Attainment	0	17	7.14	4.15
Educational Attainment of Respondent Husband	0	17	5.82	4.60

Source: Field Survey and Computed by the Researcher, 2024

Fertility Behaviour Among Muslim Women

Fertility behaviour encompasses the childbearing patterns of women and couples. Fertility is a significant factor in population dynamics, influencing both the size and structure of a population. The total fertility rate in India is 2.0 children per woman, slightly below the replacement level of 2.1. Fertility rates tend to be higher among women in rural areas as compared to urban areas. (NFHS report 5).

Figure 8
Age at first birth of women



Source: Primary Survey, 2024

Age of Respondents at First Birth

The age at first birth is considered an important demographic indicator. The study revealed that 28% of women's ages at first birth were below 18 years, and 42% of respondents reported having their first birth between 18 and 20 years of age. About 20% of women reported their age at first birth was between 21 and 23 years, and 6% reported having their first child at 24 years or older. Only 4% of respondents reported having no children at the time of the interview. The median age of women at first childbirth was 18.5 years in this study.

The descriptive statistics revealed that (see Table 4) minimum age of respondents at the birth of their first child is 15, which implies that some of the respondents are experiencing early pregnancies, which is a serious risk for both maternal and child health. At the same time, the maximum age at first childbirth is 27. The mean age at first childbirth is 19.21 years, with an SD of ±2.67, indicating moderate variation around the mean. This suggests that some women had their first child a few years before or after the mean age. The pattern of early childbearing in the study may be influenced by cultural norms, limited access to education and lack of family planning resources.

The mean number of children among respondents is 2.59, with an SD of ±1.42. It ranges from 0 to 8 children. There is variation in the number of living children among respondents. In this area, 5% of women have no children; 16% of respondents have only one living child; 30% have 2 children; 27% of respondents report having 3 living children; 12% have 4 living children; and 10% have 5 or more living children at the time of the survey. Thus, most respondents have fewer children,

while some have more. The study also indicates that younger women usually have fewer children than older women, probably because they are more educated and have easier access to family planning methods.

The average numbers of sons and daughters are 1.53 and 1.03, with SDs of ±1.105 and ±0.904, respectively. The number of sons ranges from 0 to 8, and the number of daughters from 0 to 4. This suggests that respondents in this community slightly prefer sons, as they believe sons are more likely to provide financial support.

The minimum birth interval among women is 27 months, and the maximum is 96 months. The average birth interval is 49.74 months, with an SD of ±11.284. This indicates that most women have considerable spacing between births, which is an important factor in fertility and reduces health risks for both the mother and child. The maximum number of antenatal visits among respondents is 12, and 12% of respondents did not attend any antenatal care. The average number of antenatal visits is 5.79, with a standard deviation of ±2.99, indicating a wide range in the number of antenatal visits among respondents.

Table 4

Descriptive Statistics on Fertility and Family Planning Characteristics of Respondents

Variables	Min.	Max.	Mean	SD
Respondent's age at the first childbirth	15	27	19.21	2.67
No of children	0	8	2.59	1.42
No of son	0	8	1.53	1.105
No of Daughters	0	4	1.03	.904
Birth Interval in months	27	96	49.74	11.284
No of Antenatal visits	0	12	5.79	2.99

Source: Field Survey and Computed by the Researcher, 2024

Knowledge about Family Planning Methods and Current Use of Family Planning Methods of Respondents

In the developing world, India became the first country to launch a National Family Planning Programme in 1952. Family planning is a conscious effort by a couple to limit or space the number of children they have through the use of contraceptive methods. Family planning methods are ways to avoid pregnancy or to manage or space the number of children by using contraception. In this study, most respondents (93%) were aware of family planning methods, while 7% reported being unaware of them. This evidence indicates that general awareness of family planning is high within the sample. Close to 76% of respondents and their partners are currently using family planning methods.

Table 5

Knowledge About FPM & Current Use of Family Planning Methods

Knowledge about FPM	% of respondents
Yes	93
No	7
Current use of FPM	
Yes	76 (traditional- 3, modern method- 39 & both- 34)
No	24

Among them, 39% of respondents use several modern methods, 3% use a traditional method, and 34% use both traditional and modern methods. However, 24% of respondents are currently not using any family planning methods due to a desire for more children, religiosity, and misconceptions about the safety of contraceptive methods. This result is consistent with a previous study. Shumayla & Kapoor (2017) found that the majority of respondents are aware of family planning,

but only 47% of ever-married women are currently using family planning methods. The main reasons for not using family planning methods are religious beliefs, lack of knowledge, and fear of side effects of contraceptive methods.

This study also indicated that, out of a total of 100 respondents, 15 women reported miscarriage, abortion, and stillbirth during the pregnancy period. This shows that many women face problems during pregnancy, indicating a need for improved maternal health services, early prenatal care, and support to help reduce pregnancy losses. Of 100 respondents, only 4 reported being currently pregnant, indicating a low pregnancy rate among participants. Various factors, such as family planning practices, health conditions, or personal choices, could influence this.

Association Between Fertility, Current Use of Contraceptive Methods and Socio-Demographic Variables

The fertility behaviour of women is influenced by various socio-economic, demographic and cultural factors (Chauhan et al., 2020). In this section, the association between fertility and various socio-demographic variables among Muslim women has been discussed. It also examined the relationship between the current use of contraceptive methods and respondents' socio-demographic characteristics (Table 6). The chi-square method was used to assess this association. The study revealed that respondents' current age, age at marriage and age at first childbirth are important factors influencing fertility behaviour among Muslim women. On the other hand, respondents' current age, family types, work participation and household headship are major factors affecting the current use of contraceptive methods.

It is observed from Table 6 that there is a significant relationship between fertility and respondents' current age (Chi-square = 15.325 and P = .000). In this case, fertility is low among respondents aged 18-25 years (11.8%), whereas having 3 or more children is higher among women in the >35 current age group (71.4%). This could be because younger women are more aware of and knowledgeable about family planning methods, which helps them have better control over their reproductive health and fertility decisions. Age at marriage also influences respondents' fertility behaviour. Women who were married before the legal age (<18 years) have higher fertility than those married at or above the legal age, and this association is statistically significant ($\chi 2$ = 7.707, P = 0.05). This finding is consistent with previous research conducted in Haryana (Chandiok et al., 2016) and West Bengal (Chauhan et al., 2020). It shows that early marriage can lead to early childbearing and higher fertility, especially among women with less or no education.

Table 6

Association between Fertility, Current Use of Contraceptive Methods and Socio-Demographic Variables

Influenced Variables	Influencing Variables	Chi- square value (X^2)	df	Sig(p)
Fertility	Respondents current age	15.325	2	.000
	Women's age at the time of marriage	7.707	3	.052
	Women's age at birth of the first child	14.754	3	.002
	Education Status	3.043	4	.551
	Monthly income	1.938	3	.585

Influenced Variables	Influencing Variables	Chi- square value (X^2)	df	Sig(p)
	Type of family	.536	1	.464
	Work participation	.101	1	.471
	Head of the family	1.254	2	.534
	Wealth index	1.231	2	.540
Currently using Contraceptive Methods	Respondents current age	14.072	2	.001
	Women's age at the time of marriage	3.029	3	.387
	Women's age at birth of the first child	4.495	3	.213
	Education Status	1.588	4	.811
	Monthly income	.259	3	.968
	Type of family	8.485	1	.004
	Work participation	5.879	1	.015
	Head of the family	6.223	2	.045
	Wealth index	1.741	2	.419

Source: Field Survey and Computed by the Researcher, 2024

It is also observed that when women's age at first birth is below 18 years, their fertility is higher (78%) than among other respondents, and the relationship is significant ($\chi 2$ = 14.75, P = .002). So, women's age at first birth and respondents' fertility are related. Women's age at first birth influences respondents' fertility behaviour. Besides, as respondents' educational status increases, their fertility decreases. Illiterate women (66%) have higher fertility compared to literate women (33.3%).

It is also observed from Table No. 6 that there is a significant relationship between the current use of contraceptive methods and several socio- demographic variables. The present study revealed that respondents' current age has a statistically significant association with the current use of contraceptive methods at the (X 2 = 14. 072 and P =. 001) level. Current age of women influences the use of contraceptive methods. Here, women in the <35 years age group (90%) used contraceptive methods more than those in the> 35 years age group (53. 6%). Younger women might be more educated, more aware, and have greater access to modern contraceptive methods than older women. This result is similar to the previous study (Rai et al., 2014). A significant relationship exists between family type and the use of contraceptive methods, with a p- value of 0. 004 and a chi-square value of 8. 8.485. It was found that women who belonged to nuclear families used more contraceptive methods (85.5. 5%) than those who belonged to joint families (57. 7%). This may be because women in nuclear families have greater control over reproductive decisions compared to women in joint families. In this study, work participation is also a major factor influencing the current use of contraceptive methods among respondents, and this was found to be statistically significant (χ^2 = 5.879, P = .015). It has been shown that women who are not working (83. 6%) are more likely to use contraceptive methods than working women (59.1. 1%). This study found that a significant number of working women are separated from their husbands and therefore do not require contraceptive methods. Similarly, the head of the household is significantly associated with

the use of contraceptive methods among respondents ($\chi 2 = 6.223$ and $P = 0.045$). Women whose households are headed by their husbands or other family members are more likely to use contraceptive methods (81.7. 7%) than those in self- headed households. This may be because many working women in the study area live separately from their husbands.

Fertility-Related Decision-Making Autonomy of the Respondents

The majority of respondents (70%) stated that the decision regarding first childbirth was made jointly with their partners, while 13% made it independently. On the other hand, 15% of respondents reported that their husbands decided on the first childbirth. Only 2% of respondents reported that other family members made this decision. This result indicates that most women decide regarding first childbirth jointly with their husbands. Regarding health care decisions, 42% of respondents reported making the decision themselves, 17% reported that their husband made the decision, and 31% reported that they and their partner jointly made the decision. About 10% of respondents mentioned that other family members were involved in health care decisions. Similarly, during the survey, it was found that 43% of respondents and their husbands mutually decided about the use of contraceptive methods to avoid pregnancy. About 28% of respondents reported that they had independently decided about the use of contraceptive methods, and 26% said their husband had made this decision. Only 3% were influenced by other family members. In this study, most respondents and their husbands have jointly made fertility-related decisions. However, the study also shows that 42% of respondents make health care decisions independently, which indicates a high level of health care decision-making autonomy among women in this study.

Table 7

Fertility-Related Decision-Making Autonomy of Respondents (in percentage)

Decision Making Autonomy	Self	Husband	Both	Other family member
Decision about first childbirth	13	15	70	2
Decision about health care access	42	17	31	10
Decision about use of contraceptive methods	28	26	43	3

Source: Field Survey, 2024

Association Between Socio-Demographic Variables and Fertility-Related Decision-Making Autonomy

This study shows that fertility-related decision-making autonomy is associated with various socio-demographic characteristics. Kassahun and Zewdie (2022) reported that socio-economic variables, such as higher educational attainment, age, family size, and proximity to health facilities, are associated with healthcare decision-making autonomy.

Binary logistic regression was analysed using a 95% confidence interval. Table 8 shows associations between several socio-demographic variables and fertility-related decision-making autonomy. The dependent variable is decision-making autonomy regarding first childbirth, categorised as self (1) and husband/others (0).

Table 8

Association Between Socio-Demographic Variables and the Fertility-Related Decision-Making Autonomy

Variables	Sub-group	Coefficients (B)	SE	Odds/ Exp(B)	p	95% CL of OR
Current age	18-25	1.718	.881	5.571	.051**	.991-31.338
	26-35	.324	.872	1.383	.710	.251-7.634
	>35[a]	®				
Age at Marriage	Below 18	-.624	.886	.536	.481	.094-3.040
	18-20	.174	.921	1.190	.850	.196-7.234
	21 & above[a]	®				
Age at first birth	Below 18	.329	.754	1.389	.663	.317-6.082
	18-20	.416	.818	1.515	.611	.305-7.526
	21 & above [a]	®				
Education Status	Illiterate	-.693	.924	.500	.453	.082-3.060
	Primary	-1.099	1.258	.333	.383	.028-3.926
	Secondary	-1.235	.802	.291	.124	.060-1.401
	Higher secondary & above	®				
Husband Education	Not Literate	-.916	.860	.400	.287	.074-2.159
	Primary	-20.510	10377.780	.000	.998	.000
	Secondary	-1.411	.851	.244	.098*	.046-1.293
	Higher secondary & above[a]	®				
Occupation of Husband	Agriculture	-19.671	12710.133	.000	.999	.000
	Tailoring	-.127	.671	.881	.850	.237-3.279
	Business	-1.469	1.098	.230	.181	.027-1.982
	Others[a]					
Type of family	Nuclear	.811	.606	2.250	.181	.686-7.377
	Joint [a]	®				
Monthly Income	5000-10000	.310	.926	1.364	.738	.221-8.415
	10001-15000	.251	.873	1.286	.773	.232-7.114
	15001-20000	-.693	1.278	.500	.588	.041-6.121
	>20000 [a]	®				
Wealth	Poor	-.891	.657	.410	.175	.113-1.487
	Middle	1.386	1.104	.250	.209	.029-2.176
	Rich [a]	®				

® = Reference Category, **=P<0.05, *=P< 0.1

Source: Field Survey and Computed by the Researcher, 2024

The result shows that the decision to take the first child among the 18-25 years age group of women is 5.571 times higher than the 26-35 years age group of women, and that decision-making autonomy by the 26-35 years age group of women is 1.383 times more than women> 35 years (the reference category), and it is statistically significant. This indicates that younger women (18-25 years) may have more decision-making autonomy than other age groups. Women who got married before 18 years are .536 times less likely to decide to have a first child than the reference categories. On the other hand, those who married in the 18-20 age group are 1.190 times more likely to have decision-making autonomy regarding their first child than those in the reference category. This could be because early marriage often involves more traditional and familial pressures, limited education, and social constraints.

Education is the basis of knowledge and awareness. Right education can bring the light of knowledge in one's life and can remove the darkness of prejudice. The study found that with increasing educational status, decision-making autonomy of first childbirth among women also increases.

From the results, it is seen that the decision-making autonomy at first childbirth among women with a secondary education is 0.291 times lower than that of those with higher secondary education or above (reference category). Similarly, for those with primary education, their decision-making autonomy for first childbirth is 33.3% lower than in the reference category; on the other hand, for those with no educational status, it is 50.0% lower. As women's education levels rise, their ability to make independent decisions also improves due to greater awareness, empowerment, and increased access to resources. Education plays a crucial role in enhancing decision-making autonomy.

Women living in a nuclear family are 2.250 times more likely to have higher decision-making autonomy at first childbirth than those living in a joint family (the reference category). This may be because women in nuclear families can make decisions freely, with less family pressure, whereas women in joint families may face more restrictions.

Among women in the 15001-20000 average monthly income category, decision-making autonomy regarding first birth is .500 times lower than in the reference category. Conversely, for those in the 10001-15000 and 5000-10000 average monthly income categories, decision-making autonomy regarding first birth is 1.286 and 1.364 times higher than the reference category, respectively. In this study area, various socio-economic factors influence women's decision-making autonomy, including education, social norms, patriarchal family structures, and family pressure. Interestingly, women in the moderate-income category have greater autonomy than those in high-income families.

For respondents in the middle class according to socio-economic condition, decision-making autonomy regarding first birth is .250 times higher than for those in poor families, and the decision-making autonomy of women from poor families is .410 times lower than the reference category. This indicates that socio-economic conditions greatly affect women's autonomy in fertility-related decision-making. Improving the socio-economic conditions of poor families through education, awareness, economic opportunities and empowerment programmes could enhance women's reproductive autonomy.

Findings and Conclusion

The present study has been conducted to assess fertility behaviour and decision-making autonomy regarding fertility among Muslim women in the Mathurapur I CD block in the Indian Sundarbans. The findings indicate that early marriage, limited decision-making autonomy, and son preference loom large in this area. It is also observed that women's work participation is low (24%), and the average educational status of women is 7th class. Most women are aware of family planning methods, and 24% do not use contraception because of a desire for more children and misconceptions about contraceptive methods. In this study, the current age of women (>35 years), age at marriage (<18 years), and age at first childbirth (<18 years) influence fertility behaviour. On the other hand, several socio-demographic variables, such as the current age of women, family types, working status of women, and family headship, have a greater effect on the use of contraceptive methods. This study also revealed that decision-making autonomy regarding first childbirth is associated with women's current age and the educational status of respondents and their husbands. Fertility-related decision-making autonomy is higher in the younger age group of women compared with the older age group (>35 years). It may be concluded that to improve fertility behaviour and reproductive autonomy among Muslim women, there is a need to enhance education, economic opportunities, and access to family planning. For this purpose, the Government should ensure the implementation of

primary and secondary education programmes for Muslim women, as well as a dedicated empowerment programme to help them improve their status in society. The development of community-based awareness programmes on maternal and child health and family planning methods is needed.

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In-Depth Exploration of Infant Mortality Determinants in Jharkhand: A District-level Perspective Utilising Health Management Information System Data

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Abstract
This study examines inter-district disparities in infant mortality within Jharkhand, with a specific focus on the factors that influence it. Infant mortality is defined as deaths between birth and 11 months. Data for the study have been collected from the Health Management Information System for 2019–20. The variables used in the study are sepsis, asphyxia, pneumonia, diarrhoea, fever, and measles. The analysis revealed an overall infant mortality rate of 797 per 100,000 live births in Jharkhand, with Purbi Singhbhum registering the highest rate at 2448 per 100,000 live births and Dhanbad the lowest at 250 per 100,000 live births. These findings underscore substantial disparities in infant mortality, indicative of broader disparities in overall health status in Jharkhand. Furthermore, the study identifies asphyxia and sepsis as primary contributors to infant deaths in Jharkhand, suggesting a need for decentralised policies, empirical healthcare research, and community engagement to mitigate these ailments.
Keywords*:* Infant mortality rate, infant death, Jharkhand, health disparities, child mortality

Introduction

Positive health is indispensable for thriving, fostering mental and psychological well-being, and enhancing overall health behaviours to facilitate effective learning (Hoare & Robinson, 2017). Sustainable Development Goal 3, outlined in the 2030 Agenda for Sustainable Development, aims to "promote healthy lives and well-being for individuals of all ages". Embracing well-being and adopting healthy behaviours empower individuals to maximise their educational potential while laying the groundwork for enduring fulfilment and achievement (Sharma & Thapa, 2023; Beard & Thomson, 2021). By recognising that health conditions are a primary indicator of a society's well-being (Fleischmann et al., 2021; Herrera-Limones et al., 2021; Gupta & Ladusingh, 2016), individuals can better appreciate the profound impact of embracing well-being and adopting healthy behaviours on both personal and societal levels (Brüggen et al., 2017; Bahl et al., 2016; Inchley et al., 2016). Improving the nation's overall health is instrumental in achieving socioeconomic

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advancement (Kaur et al., 2023; Saravanabavan et al., 2021).

Ensuring women's and children's health is crucial for securing the welfare and advancement of forthcoming generations (Islam et al., 2022; Syamsi & Zulala, 2021). Infant health plays a pivotal role in shaping society's trajectory, paving the way for a robust and adaptable populace (Anyanwu et al., 2024; Bharadwaj et al., 2020). Prioritising the well-being of infants fosters economic growth, community unity, and healthcare system preparedness, offering broad-ranging benefits for both individuals and collective well-being (Verma et al., 2021). Infant mortality (between birth and 11 months) has a significant impact on public health worldwide (Heft-Neal et al., 2018; Singh, 2019; Hofmeyr et al., 2009; Hortensia et al., 1997), and it is a major concern in global health (Quansah et al., 2015; Lehtonen et al., 2017). According to the United Nations International Children's Emergency Fund (UNICEF, 2017), 4.1 million IDs were recorded worldwide. On a global scale, the infant mortality rate has declined from approximately 65 deaths per 1000 live births in 1990 to 29 deaths per 1000 live births in 2018 (WHO, 2020).

The third Sustainable Development Goal (SDG), "Ensure healthy lives and promote well-being for all ages," addresses child health. Target 3.2 of SDG 3 is dedicated to child health. The goal is to "end preventable deaths of newborns and children under five years of age, with all countries aiming to reduce neonatal mortality to at least as low as 12 per 1,000 live births and under-5 mortality to at least as low as 25 per 1,000 live births by 2030" (Yovo, 2022).

Infant vulnerability is shaped by the complex interplay of maternal well-being, healthcare access, and socioeconomic inequality (Gupta & Yadav, 2016; Jajoo et al., 2015; Ladusingh et al., 2016; Visaria, 1985). Addressing these issues is essential to implementing targeted initiatives that would dramatically reduce infant mortality rates and, in turn, improve public health generally and globally. Thus, infant mortality rates are influenced by many intricate, interrelated causes (Ferrero et al., 2016; Black et al., 2010). One major factor is limited access to healthcare, especially in low-income areas (Johar et al., 2018; Adebayo et al., 2015). Maternal education (Wang et al., 2021; Grépin & Bharadwaj, 2015), socioeconomic level (Zilidis & Hadjichristodoulou, 2020; Chen et al., 2016), and health infrastructure (Karra et al., 2017) are essential determinants of the quality of prenatal care and infant health. Mortality rates are also influenced by cultural practices, hygiene, and the prevalence of infectious diseases (Chikkanna et al., 2020; Marabele et al., 2020; Jagannathan et al., 2019; Babu et al., 2014; Dalal & Bodar, 2013). Addressing these complex variables is necessary for effective responses.

India has the highest number of child deaths in the world and in Southeast Asia (Chaurasia, 2020; Kamath, 2015; Raj et al., 2010; Bhalotra, 2007). A report from the Ministry of Health and Family Welfare (2022) stated that India's IMR in 2000 was 28 per 1000 LBs. India not only has higher IDs than many other countries but also exhibits interstate differences in IDs (Dreze et al., 2020). The differences in IDs are not limited to inter-state variation. Differences are also found across social groups in India. There were differences between rural and urban IMRs, with 12 per 100,000 LBs, but male and female IMRs were the same in India in 2020 (Ministry of Health and Family Welfare, 2022).

The primary objective of this study is to conduct an exhaustive investigation into the determinants of infant mortality in Jharkhand, with a specific emphasis on examining these factors at the district level. The research endeavours to furnish regionally tailored insights into the determinants of infant mortality rates through a meticulous analysis of district-level data. By undertaking this

comprehensive inquiry, the study aims to identify the principal drivers of infant mortality and delineate potential avenues for targeted interventions to improve child health outcomes across Jharkhand. Ultimately, the overarching aim is to develop evidence-based strategies and policies to mitigate infant mortality rates and advance infant well-being throughout the state.

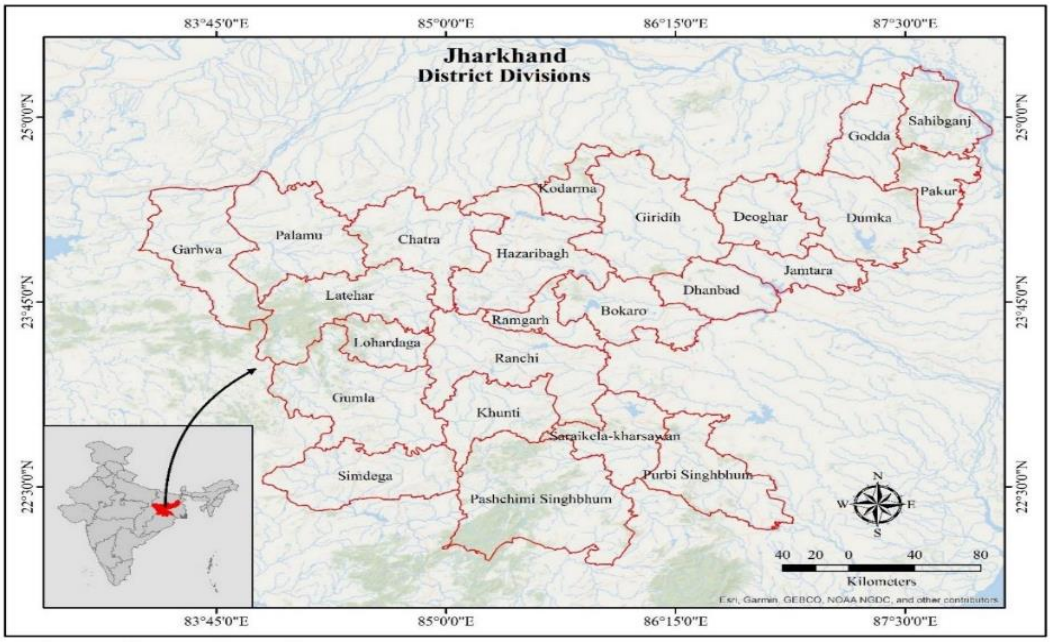
Objective of Study

This research aims to examine the factors influencing infant mortality in Jharkhand, with a focus on the district-level context. The study seeks to identify and analyse the primary determinants of variations in infant mortality rates.

Study Area

The study area for the research paper on population dynamics in Jharkhand encompasses the entire state in eastern India (Dubey et al., 2022). Established as a separate entity from Bihar on November 15, 2000, Jharkhand covers 79,716 square kilometres. It accounts for 2.42 per cent of the country's total physical area (Arjumand et al., 2024). The state lies between 22°00' N and 24°37' N latitudes and 83°15' E and 87°01' E longitudes (Tirkey et al., 2018) (Fig. 1). Bounded by Bihar to the north, Uttar Pradesh to the northwest, Chhattisgarh to the west, Odisha to the south, and West Bengal to the east, the state is geographically diverse. It features four prominent plateaus, including the Chhota Nagpur Plateau, and is intersected by major rivers such as the Ganga, Son, South Koel, Baitarni, and Damodar. Jharkhand experiences a tropical climate characterised by an average annual rainfall of about 900 mm and temperatures ranging from 4°C to 47°C. With a population of 32.99 million, Jharkhand's demographic composition comprises 75.95 per cent rural and 24.05 per cent urban inhabitants, yielding a population density of 414 individuals per square kilometre. This density is higher than the country's population density (382). Notably, Jharkhand is home to a significant tribal population. According to the Census (2011), the Scheduled Tribes population in Jharkhand numbered 8.6 million, representing 26.2 per cent of the state's overall population.

Figure 1
Location of the Study Area



Database and Approach

For the study, data were collected from the Health Management Information System (HMIS). HMIS collected data largely under three headings: service delivery, health infrastructure, and human resources for health. Service delivery covered a range of health indicators, including maternal and child health. The HMIS comprises five types of health centres, from lower to higher levels: sub-centres, primary health centres, community health centres, sub-district level hospitals, and district hospitals. The manuscript uses HMIS data for 2019–20 (Ministry of Health and Family Welfare, 2021).

Variables

The variables used in the study included sepsis, asphyxia, pneumonia, diarrhoea, fever, and measles (Ministry of Health and Family Welfare, 2021) (Table 1). These diseases were directly or indirectly responsible for many children's deaths in the country (Bhandari et al., 2002).

Table 1

Variables Used in the Study

Variables	Units
Infant Deaths	Numbers
Sepsis	Percent
Asphyxia	Percent
Pneumonia	Percent
Diarrhea	Percent
Fever	Percent
Measle	Percent

Source: Ministry of Health and Family Welfare, 2021
Year: 2019-20

Methods

Utilising Equation 1 (Victora et al., 1993; Osuntokun & Binuyo, 2021), IDs (Infant Deaths) per 100,000 Live Births for all districts within Jharkhand were calculated using straightforward statistical methods.

$$IMR = NIDD/NIDS \times 100000^{*} \quad [1]$$

IMR is the infant mortality rate, and * represents the LBs in lakh.

The percentage of Infant Deaths (IDs) relative to the total number of IDs for each district in Jharkhand was calculated using Equation 2, as outlined in Bhandari et al. (2002).

$$PI = NIDD/NIDS \times 100 \quad [2]$$

In the context provided, the variable "PI" denotes the Percentage of Infant Deaths (IDs) in a district, "NIDD" represents the Number of Infant Deaths in a district, and "NIDS" signifies the Total Number of Infant Deaths in the state.

The district-level Infant Deaths (IDs) per 100,000 Live Births and the corresponding percentage of IDs to total IDs were visualised using an Excel bar graph and maps generated with QGIS version 3.10. This approach facilitated a comprehensive visualisation of the distribution and relative proportions of IDs across different districts within Jharkhand.

Procedures for Ranking Causes of Death

The study employed the methodology outlined in the 1951 Public Health Conference on Records and Statistics to rank causes of death, organising them by the number of deaths attributed to each cause. This approach, utilising death counts as the ranking factor, was selected for its ability to provide the most accurate representation of cause-specific deaths occurring within the region (Heron, 2017). The causes of infant deaths were delineated and presented in tabular form, providing a systematic breakdown of the factors contributing to infant mortality in the study area.

Results and Discussion

District-wise IDs in Jharkhand

In the study, it was observed that 797 infants per 100,000 Live Births (LB) died in Jharkhand during 2019–20. Figure 2 illustrates the district-wise distribution of

Infant Deaths (IDs) per 100,000 Live Births (LBs in Jharkhand, categorised into five distinct groups. The first group ranged between 250 and 377 IDs per 100,000 LBs, encompassing the districts of Palamu, Hazaribagh, Giridih, Dhanbad, and Godda. Similarly, the second group spanned from 378 to 502 IDs per 100,000 LBs, comprising the districts of Garhwa, Koderma, Ranchi, and Pakur. Furthermore, the third group ranged from 503 to 690 IDs per 100,000 LBs, including the districts of Chatra, Latehar, Ramgarh, Bokaro, and Sahibganj. Additionally, the fourth group ranged from 691 to 1298 IDs per 100,000 LBs, covering the districts of Simdega, Khunti, Saraikela-Kharsawan, Lohardaga, and Jamtara. Lastly, the fifth group ranged from 1298 to 2448 IDs per 100,000 LBs, encompassing the districts of Gumla, Paschim Singhbhum, Purbi Singhbhum, and Dumka (see Figure 2). Furthermore, it was noted that Purbi Singhbhum recorded the highest ID rate (2448), while Dhanbad exhibited the lowest rate (250) per 100,000 LBs (refer to Figure 3).

District-wise Per cent of Infant Deaths to Total Infant Deaths of Jharkhand

Figure 4 illustrates the district-wise percentage distribution of Infant Deaths (IDs) relative to the total in Jharkhand, categorised into five distinct groups. The first group encompasses districts with values ranging from 1.67 to 2.16 per cent, including Latehar, Simdega, Ramgarh, and Koderma. Similarly, the second group comprises districts with values ranging from 2.17 to 2.50 per cent, encompassing Garhwa, Hazaribagh, Pakur, and Lohardaga. Furthermore, the third group encompasses districts with values ranging from 2.51 to 2.97 per cent, including Palamu, Chatra, Giridih, Deoghar, and Dhanbad.

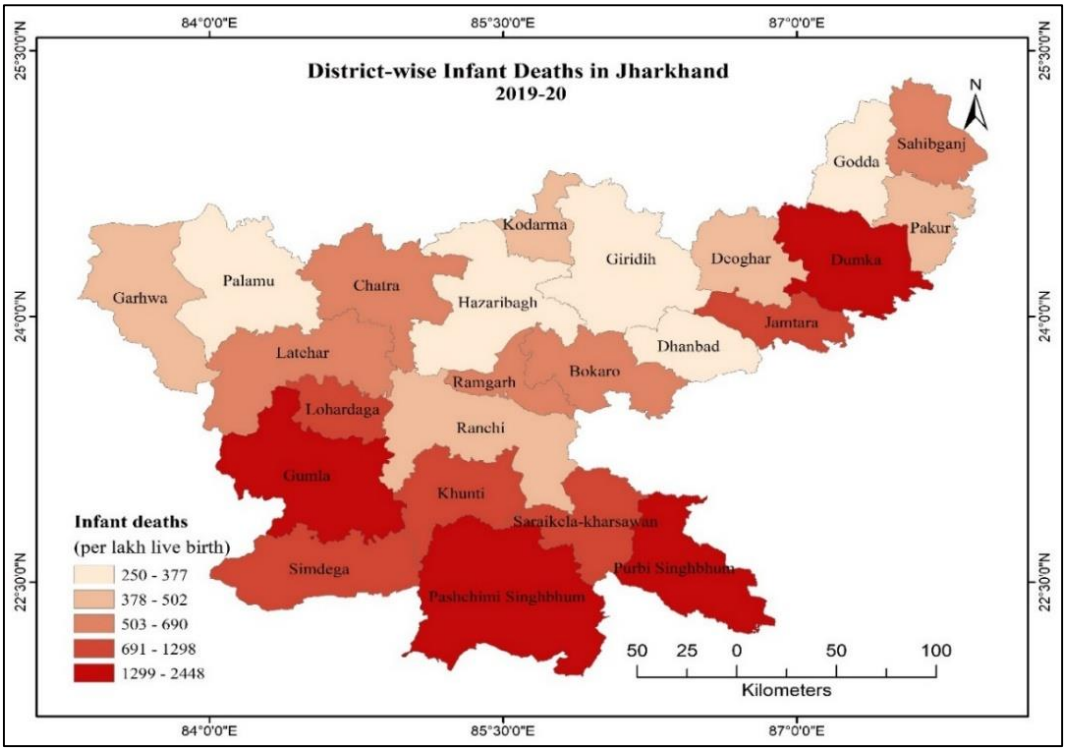
The fourth group comprises districts with values ranging from 2.98 to 4.93 per cent, including Gumla, Saraikela-Kharsawan, Bokaro, Jamtara, and Sahibganj. Lastly, the fifth group includes districts with values ranging from 4.94 to 18.78 per cent, consisting of Paschimi Singhbhum, Purbi Singhbhum, Ranchi, and Dumka. Furthermore, Purbi Singhbhum district recorded the highest percentage (18.79 per cent). At the same time, Ramgarh and Latehar exhibited the lowest percentage (1.67 per cent) of IDs among total infant deaths in Jharkhand (see Figure 5).

Causes of Infant Deaths

Figure 6 presents the district-wise distribution of infant deaths in Jharkhand attributed to various diseases. Sepsis emerged as the primary cause of infant deaths in districts such as Chatra, Deoghar, Bokaro, Koderma, Godda, Garhwa, Dhanbad, and Khunti. Conversely, asphyxia accounted for the majority of infant deaths in Lohardaga, Purbi Singhbhum, Latehar, Paschimi Singhbhum, Hazaribagh, Gumla, Saraikela Kharsawan, and Palamu districts of Jharkhand. Only the Pakur and Ranchi districts reported fever as the predominant cause of infant deaths, whereas none identified measles as a significant contributing factor (see Table 2). Furthermore, the analysis presented in Table 3 revealed that sepsis and asphyxia were consistently identified as significant causes of infant deaths across many districts. Consequently, it can be inferred that sepsis and asphyxia collectively accounted for the highest proportion of infant deaths in the state of Jharkhand.

Figure 2

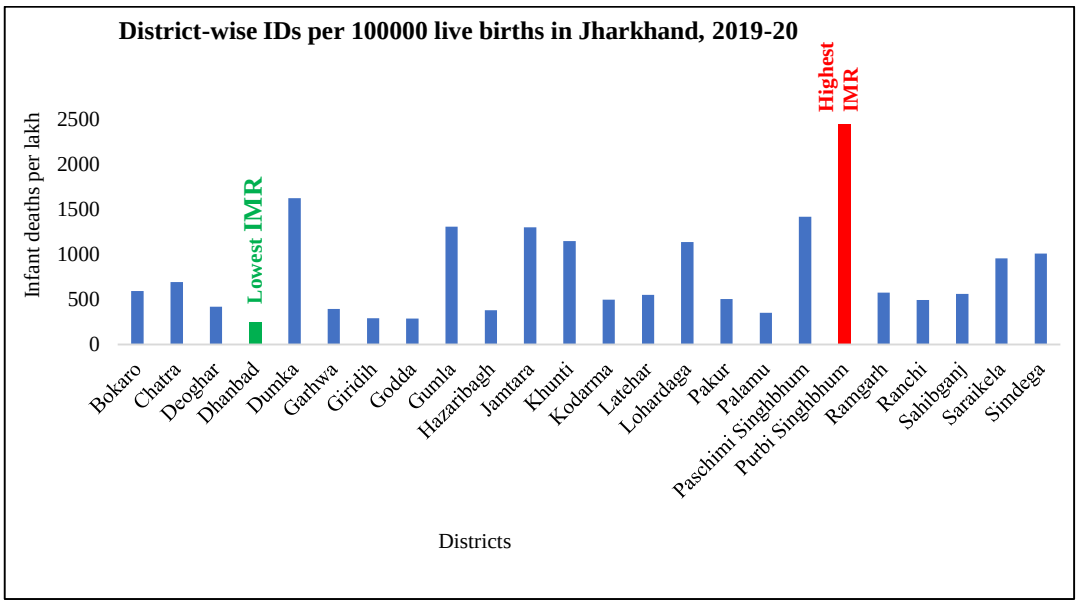
District-wise Infant Deaths per Lakh Live Births in Jharkhand, 2019-20



Source: HMIS, 2019-20

Figure 3

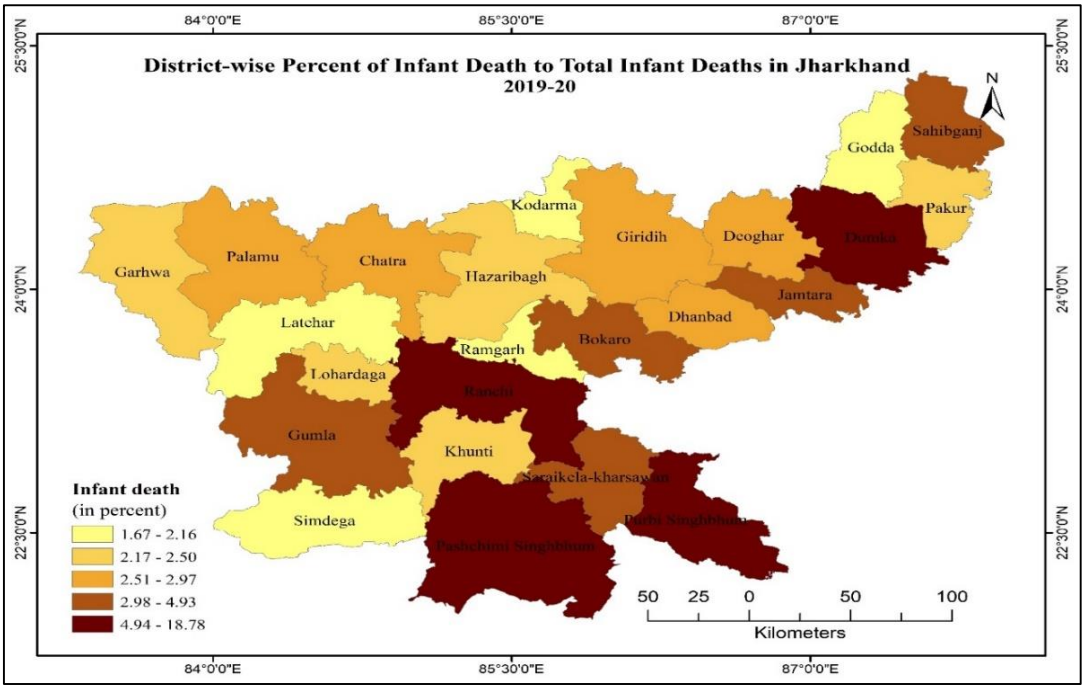
District-wise Infant Deaths per Lakh Live Births in Jharkhand, 2019-20



Source: HMIS, 2019-20

Figure 4

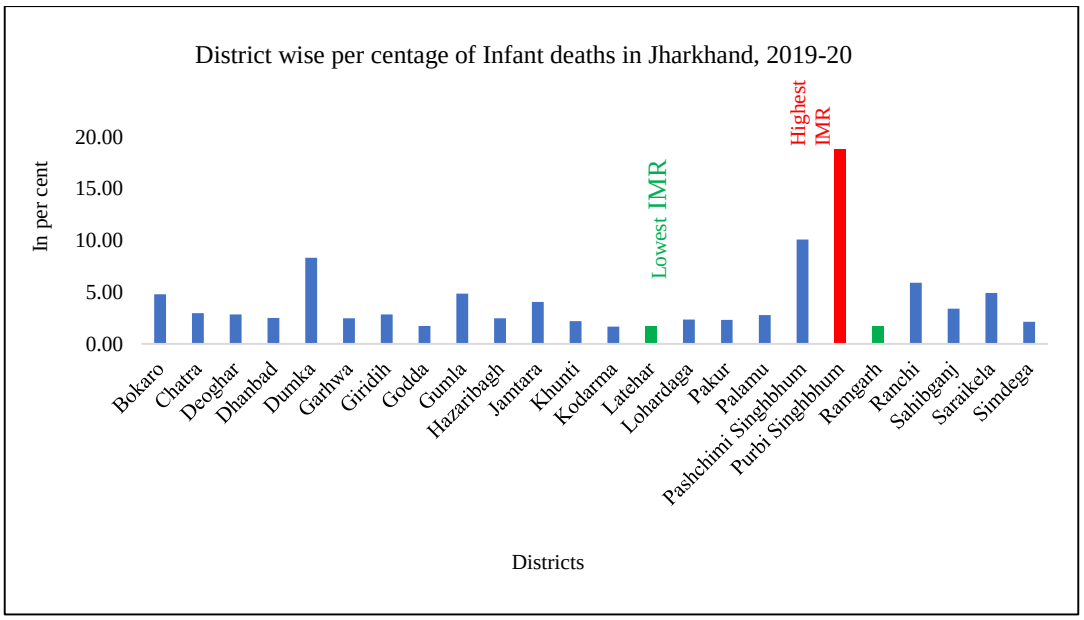
Percentage of Infant Deaths to Total Infant Deaths of Jharkhand, 2019-20



Source: HMIS, 2019-20

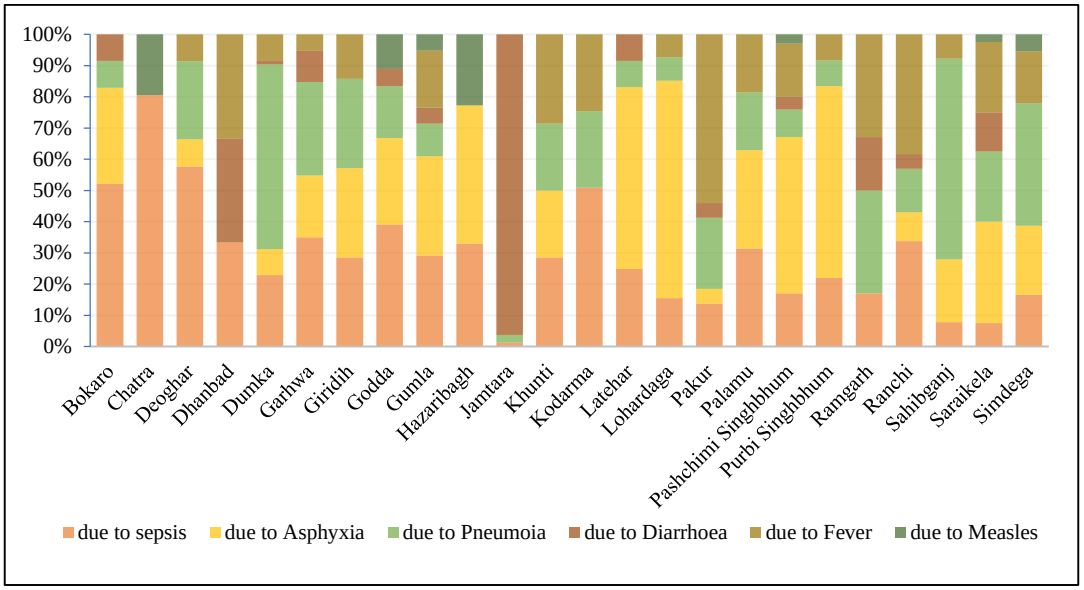
Figure 5

Percentage of Infant Deaths to Total Infant Deaths in Jharkhand, 2019-20



Source: HMIS, 2019-20

Figure 6
Districts with Causes of Infant Deaths in Jharkhand, 2019-20



Source: HMIS, 2019-20

Table 2
Districts with Significant Causes of Infant Deaths in Ascending Order (low to high) in Jharkhand, 2019-20

Districts	Major causes of infant deaths in ascending order	Districts	Major causes of infant deaths in ascending order
Bokaro	Pneumonia >Diarrhoea> Asphyxia> Sepsis	Koderma	Pneumonia> Fever> Sepsis
Chatra	Measles> Sepsis	Latehar	Diarrhoea> Pneumonia> Sepsis> Asphyxia
Garhwa	Fever>Diarrhoea>Asphyxia>Pneumonia>Sepsis	Lohardaga	Fever >Pneumonia >Sepsis> Asphyxia
Dhanbad	Fever> Diarrhoea> Sepsis	Pakur	Asphyxia> Diarrhoea> Sepsis> Pneumonia> Fever
Dumka	Diarrhoea >Fever >Asphyxia >Sepsis >Pneumonia	Palamu	Fever> Pneumonia >Sepsis> Asphyxia
Deoghar	Asphyxia >Fever >Pneumonia >Sepsis	Paschimi Singhbhum	Measles> Diarrhoea> Pneumonia> Fever> Sepsis> Asphyxia
Giridih	Fever> Sepsis> Asphyxia>Pneumonia >	Purbi Singhbhum	Fever> Pneumonia> Sepsis> Asphyxia
Godda	Diarrhoea> Measles> Pneumonia > Asphyxia> Sepsis	Ramgarh	Diarrhoea> Sepsis> Pneumonia> Fever
Gumla	Measles> Diarrhoea> Pneumonia> Fever> Sepsis> Asphyxia	Ranchi	Diarrhoea> Asphyxia> Pneumonia> Sepsis> Fever
Hazaribagh	Measles> Sepsis> Asphyxia	Sahibganj	Fever> Sepsis> Asphyxia >> Pneumonia
Jamtara	Asphyxia> Pneumonia> Diarrhoea	Saraikela Kharsawan	Measles> Sepsis> Diarrhoea> Pneumonia> Fever>Asphyxia
Khunti	Pneumonia> Asphyxia> Fever> Sepsis	Simdega	Measles> Fever> Sepsis> Pneumonia

Source: HMIS, 2019-20

Table 3
Disease-Wise Infant Deaths in Districts of Jharkhand, 2019-20

Diseases	Districts
Sepsis	Godda, Khunti, Koderma, Bokaro, Chatra, Garhwa, Deoghar and Dhanbad
Asphyxia	Gumla, Hazaribagh, Latehar, Lohardaga, Palamu, Paschimi Singhbhum, Purbi Singhbhum and Saraikela-Kharsawan
Pneumonia	Sahibganj, Dumka, Giridih, Ramgarh and Simdega
Diarrhea	Jamtara
Fever	Pakur and Ranchi
Measles	None

Source: HMIS, 2019-20

Discussion

The study delves into the intricate web of challenges plaguing Jharkhand's healthcare landscape, particularly in confronting infant mortality rates (IMRs). In the tumultuous tapestry of India's demographic fabric, Jharkhand emerges as a crucible of entrenched healthcare disparities, grappling with the formidable task of safeguarding the lives of its youngest inhabitants. Against this backdrop, the study illuminates the multifaceted dimensions of Jharkhand's healthcare crisis, unravelling the intricacies of infant mortality and delineating a roadmap for concerted action.

During the annals of 2019-20, Jharkhand bore witness to a stark manifestation of its healthcare woes, with a staggering toll of 797 Infant Deaths (IDs) per 100,000 live births etching a sombre epitaph on the state's infant health landscape. These grim statistics serve as a poignant reminder of the urgent imperative to erect robust bulwarks against the relentless tide of infant mortality, compelling stakeholders to chart a course towards transformative healthcare interventions. Moreover, the study casts a piercing gaze into the kaleidoscope of district-level disparities, revealing a patchwork of afflictions that punctuate the fabric of Jharkhand's healthcare landscape. From the hallowed precincts of Purbi Singhbhum, where the scourge of infant mortality looms large, to the resilient bastions of Dhanbad, where a glimmer of hope emerges amidst the darkness, the district-level tableau underscores the nuanced contours of Jharkhand's healthcare saga.

Amid the labyrinthine healthcare challenges, the study excavates the root causes of Jharkhand's elevated IMRs, unearthing a trove of socioeconomic disparities embedded in the state's socioeconomic bedrock. Juxtaposed against the backdrop of India's healthcare tapestry, Jharkhand emerges as a crucible of adversity, ensnared within the web of high fertility and mortality rates that cast a shadow over its developmental trajectory. Despite the catalytic impetus provided by initiatives such as the National Health Mission (NHM) in 2005, Jharkhand grapples with the spectre of unmet targets, as cultural and environmental fault lines impede progress towards curbing infant mortality. The state's inclusion in the Government of India's high-focus states underscores the profound chasm between aspiration and attainment, encapsulating the uphill battle against entrenched healthcare disparities.

Furthermore, the study unravels the complex tapestry of infant mortality in Jharkhand, delineating the primacy of asphyxia and sepsis as the vanguards of

infant mortality. Birth asphyxia, emblematic of the precarious dance between life and death during childbirth, emerges as a potent harbinger of neonatal mortality, ensnaring vulnerable lives in its insidious grip. The prevalence of asphyxia in Jharkhand underscores the urgent need for targeted interventions aimed at fortifying maternal health infrastructure and bolstering neonatal care protocols to mitigate the ravages of this silent scourge. Similarly, sepsis, an insidious assailant lurking in the shadows of neonatal wards, emerges as a potent threat to infant health, transcending the barriers of socioeconomic stratification to afflict lives across the social spectrum. The prevalence of sepsis in Jharkhand underscores the urgent imperative for research into its underlying determinants and the development of evidence-based interventions to stem its inexorable tide.

The study serves as a clarion call to action, urging stakeholders to transcend complacency and catalyse transformative change within Jharkhand's healthcare landscape. Targeted healthcare initiatives, buttressed by robust infrastructure and informed by empirical research, stand poised to chart a course toward equitable healthcare access and improved child health outcomes. As Jharkhand navigates the treacherous waters of healthcare reform, concerted efforts to address socioeconomic disparities, fortify maternal and neonatal care infrastructure, and enhance healthcare awareness promise a brighter tomorrow for the state's youngest denizens. In the crucible of adversity lies the crucible of opportunity, beckoning stakeholders to seize the mantle of change and forge a path towards a future where infant mortality is consigned to the annals of history, and the promise of health and well-being illuminates the horizon.

Summary and Conclusion

In conclusion, the findings of this study underscore the urgent need for targeted interventions to address the alarming rates of infant mortality in Jharkhand. The stark district-level disparities in infant death rates highlight the critical importance of targeted healthcare initiatives tailored to the specific needs of different regions. Addressing the leading causes of infant mortality, namely asphyxia and sepsis, requires a multifaceted approach encompassing improvements in healthcare infrastructure, access to advanced medical technologies, and raising awareness among communities. Moreover, the study addresses socioeconomic disparities that contribute to unequal health outcomes. Investing in socioeconomically disadvantaged regions and communities is essential for bridging the gap in healthcare access and improving overall child health outcomes. Furthermore, efforts to strengthen healthcare systems and enhance the quality of maternal and child healthcare services are paramount.

Achieving significant reductions in infant mortality requires a comprehensive, collaborative approach involving policymakers, healthcare providers, community leaders, and other stakeholders. By addressing the underlying determinants of infant mortality and implementing evidence-based interventions, we can strive towards ensuring the health and well-being of all children in Jharkhand.

Declarations

This manuscript is original, not an extension of prior work, and has not been published anywhere else in any form or language. It has not been submitted to more than one journal. Results are provided clearly and genuinely without exaggeration, falsification, or improper data modification. Editorial and academic ethics have been

upheld in this paper. The authors did not use any of their previously published original works.

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Occupational Structure of Population in Alwar District, Rajasthan, India

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Abstract

At the spatial level, socio-economic factors significantly influence the population's functional structure within the study area. Notably, 32.10% of residents are employed, indicating a moderate level of workforce participation. In contrast, a considerable portion of the population, comprising 14.40%, is classified as marginal workers, while a substantial 53.49% are categorised as non-working individuals. This distribution underscores potential challenges associated with job availability and workforce engagement. Among the employed population, a predominant majority, 62.05%, identify as farmers, reflecting the agricultural orientation of the region's economy. Additionally, 9.11% of the employed individuals fulfil dual roles as both farmers and labourers, indicating the versatility and multitasking capabilities of the workforce. Furthermore, a small segment of the employed population, accounting for 2.13%, works in family and household industries, which may encompass various small-scale production and service activities conducted in homes. Finally, 27.02% of the workforce is engaged in a diverse range of other occupations, suggesting a variety of job opportunities that extend beyond the agricultural sector. These statistics provide a comprehensive overview of the employment landscape in the region, elucidating the interplay between socio-economic factors and occupational distribution.

Keywords: Functional structure, marginal workers, farmers, population, industries

Introduction

In the study area, significant inequality has been found in the distribution of the working population. (Acharya & Sagar, 2007) Although the highest participation of the working population in a study unit is a factor in the economic prosperity of that place, it cannot be considered an appropriate indicator of economic development in the true sense, because participation is highest in economically backward areas. (Aravali, n.d.) The urban population contributes more to the marketing sector, agricultural business, and related activities. (Bajpai & Dholakia, 2006a)

Study Area

The Alwar district lies between latitudes 27°41' and 28°04' north and longitudes 76°07' and 77°13' east. Its northeastern border adjoins Haryana and the Bharatpur district of Rajasthan, while to the north and southwest it borders Haryana, Jaipur, and Dausa districts. The district measures 137

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kilometres north-south and 110 kilometres east-west, covering 2.44% of Rajasthan's total area. The total geographical area of Alwar district is 8,380 square kilometres, equivalent to 838,000 hectares. According to the 2011 Census, the district's total population is 3,674,179, comprising 1,939,026 men and 1,735,153 women. (Census Office, 2011) The district's location is illustrated in Figure 1.

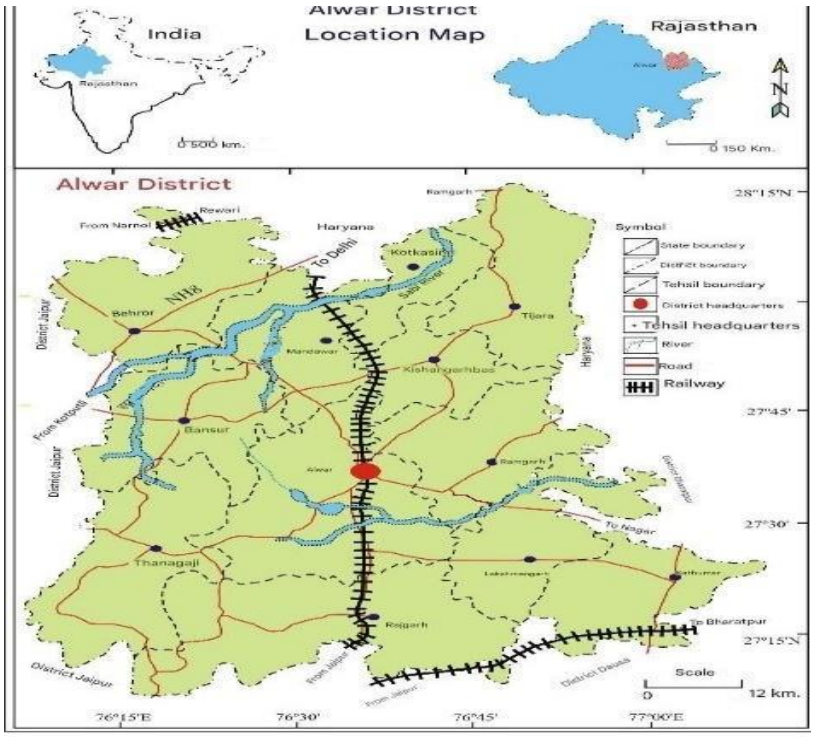
Objectives

1. To analyse the functional structure of the study area.

2. To ascertain the proportions of the marginal and working populations, as well as the non-working population, within the occupational structure of the study area.

3. To evaluate the ratio of the business population in both rural and urban regions of the study area at the tehsil level.

Figure 1
Alwar District: Regional Setting



Hypotheses

1. The largest segment within the occupational structure of the study area consists of farmers.

2. In tehsils with a higher urban population, a greater number of individuals are engaged in non-agricultural activities.

3. Given that the study area is predominantly centred on agriculture, a larger proportion of the population participates in agricultural activities relative to other occupations.

Methodology

Comprehensive population-related data have been meticulously collected from the Census Department in Jaipur, providing a crucial foundation for our research. In addition to these primary sources, we have also obtained valuable supplementary information from the District Statistical

Framework of Alwar and the Directorate of Economics and Statistics, both located in Jaipur. (Directorate of Economics and Statistics, 2011)

This research paper focuses on data collected at the tehsil level, enabling a more granular understanding of population dynamics. Using this detailed information, we have represented the demographic patterns within the region.

Furthermore, some data have been collected at the district level, enabling us to conduct a rigorous statistical analysis. The findings from this analysis provide deeper insights into broader population trends. They are presented in this paper, thereby enriching our understanding of the demographic landscape in the areas studied.

Functional Pattern of Population

The participation rate of the active workforce in a designated area is a crucial indicator of both the community's socio-economic status and its age demographics. (Ministry of Labour, 2007) This participation rate offers insights into the locality's socio-economic development, reflecting the intricacies of its occupational structure and the pace of economic growth. (Desai & Joshi, 2014)

In the district under discussion, the active population participation rate increased from 35.10% in 2001 to 38.61% in 2011. This growth indicates a positive trend in workforce engagement over the decade. A closer look at the composition of the working population shows that men constitute a larger share of the workforce, at 45.40%, while women represent a smaller proportion, at 30.27%.

An analysis of labour force participation shows minimal disparity between rural and urban settings, with both areas exhibiting comparable levels of engagement. Specifically, the male participation rate in rural regions is 45.45%, slightly lower than in urban areas (47.71%). However, the contrast becomes stark when examining female participation rates. In rural areas, women's participation is 23.31%, whereas in urban settings it drops dramatically to 8.09%. (Deshmukh-Ranadive, 2004) This discrepancy highlights the challenges women face in urban labour markets compared with those in rural areas. (Singh et al., 2022)

Moreover, it is important to note the significant variation in the distribution of the working population across the district's tehsils (administrative divisions). While a high participation rate in a particular area may suggest economic prosperity, it does not necessarily equate to genuine economic development or well-being. Frequently, regions with the highest participation rates are economically disadvantaged and struggling with poverty. This paradox underscores the complexity of interpreting participation rates as measures of economic health.

Interestingly, the district's urban population plays a substantial role in agricultural businesses and related activities, further shaping the region's economic landscape.

According to the 2011 census data, the working population within the district is categorised by occupation, providing a clearer picture of the local economic framework. Further insights into this occupational distribution will shed light on the prevailing industries and job sectors that characterise the district's labour market.

Tenant Farmer

The Alwar district stands out for having the highest proportion of farmers in its working population. According to recent statistics, a remarkable 62.05 per cent of individuals in the district are engaged in agriculture as

cultivators. This substantial figure highlights the critical role that farming plays in the local economy and lifestyle.

A closer examination of the data in Figure 2 and Table 1 reveals significant disparities among the tehsils within the district. For example, Laxmangarh tehsil leads with an impressive 81.31 per cent of its working population engaged in agriculture, making it a hub for cultivation in the region. This high percentage can be attributed to the tehsil's predominantly rural character, where farming is a primary occupation.

In stark contrast, Alwar tehsil has the lowest percentage of cultivators, at only 44.30 per cent. This notable difference can largely be explained by Alwar's demographic composition, in which a considerable segment of the population is engaged in non-agricultural

employment. The presence of urbanised areas and higher population density in Alwar has increased job opportunities in sectors outside agriculture, such as manufacturing, services, and trade. This shift towards urban employment has reduced the percentage of the workforce engaged in farming within the tehsil. Overall, the variations among the tehsils encapsulate the diverse economic engagements and lifestyles present in the Alwar district.

Agricultural Labourer

In the Alwar district of Rajasthan, a significant portion of the working population is engaged in agricultural labour, specifically 9.11 per cent. This figure highlights the importance of agriculture as a livelihood for many in the region. Among the various tehsils in Alwar, Kotakasim stands out for having the highest concentration of agricultural labourers, with an impressive 12.27 per cent of the local workforce employed in this sector. This indicates a strong reliance on agriculture in that area, likely due to the dominance of farming activities and crop production.

Following closely is Ramgarh tehsil, where 12.01 per cent of its working population is similarly engaged in agricultural labour. The similar percentages in these two tehsils suggest that agriculture plays a pivotal role in local economies, possibly shaping community life and labour dynamics.

Conversely, Laxmangarh tehsil exhibits a significant contrast, with only 6.40 per cent of its workforce involved in agricultural occupations. This lower percentage can be attributed to several factors, including the availability of alternative employment opportunities that may attract workers away from agriculture. Additionally, the limited agricultural land in Laxmangarh may limit farming, leading to a decline in the number of individuals pursuing agricultural work. Overall, the distribution of agricultural labour in Alwar district reflects broader economic trends and the shifting dynamics of rural employment.

Family and Household Industry

In the district's workforce, a notable 2.13 per cent of the working population is employed in the handloom and carpet industries, which are significant sectors for local economic activity. Among the various tehsils in the district, Thanagazi has the highest employment rate in these industries, at 6.15 per cent. This pronounced figure can be attributed to the

presence and proliferation of numerous domestic businesses that support these artisanal sectors, thereby providing ample job opportunities for residents.

Figure 2

Tenant Farmer

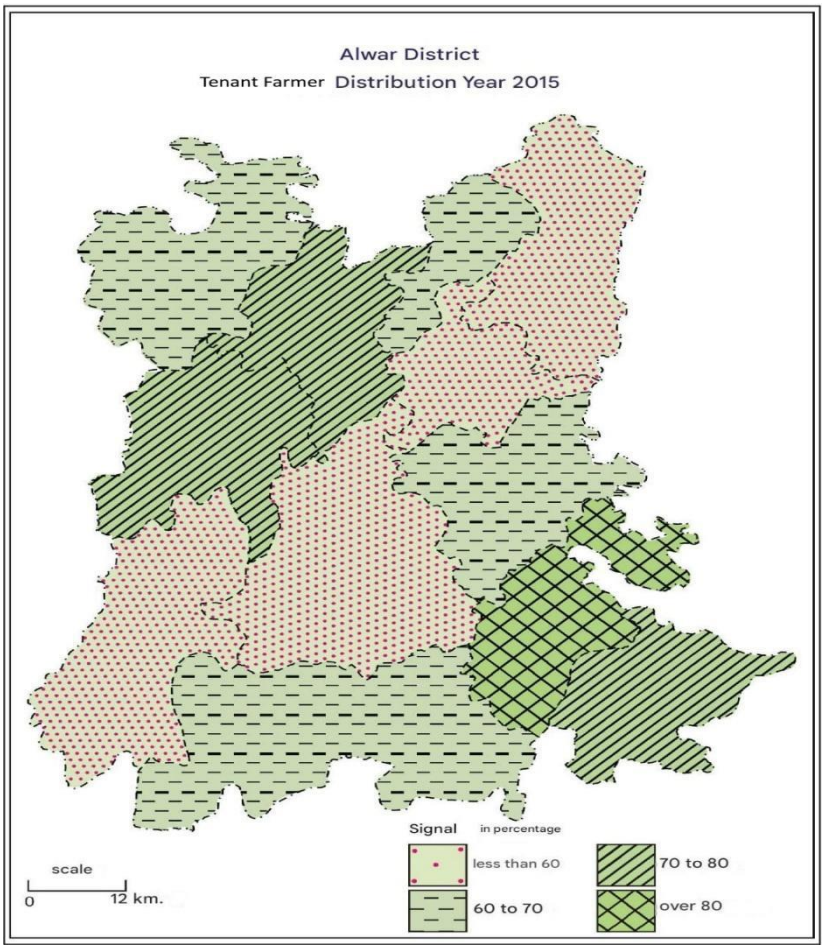


Table 1

Occupational Structure of Population in Alwar District, 2011

District/Tehsil		Farmer		Farm Worker		Family Industry		Other functionaries	
		Male	Woman	Male	Woman	Male	Woman	Male	Woman
District Alwar	Rural	464532	431013	50832	75477	15403	10896	195410	76503
	Urban	5351	4311	936	1197	2920	1805	106427	15673
	sum	46883	435324	51768	76674	18323	12701	301837	92176
Behror	Rural	50387	53539	6947	11293	1422	1100	24232	6007
	Urban	733	732	113	154	182	110	5736	936
	sum	51120	54262	7060	11447	1604	1210	29368	6943
Mundawar	Rural	43148	42181	6609	9057	1177	619	13771	4651
	Urban								
	sum	43148	42181	6609	9057	1177	619	13771	4651
Kotkasim	Rural	2103	18775	3508	4489	652	368	7631	3724
	Urban								
	sum	2103	18775	3508	4489	652	368	7631	3724
Tijara	Rural	40698	26139	4132	4742	944	756	25704	24171
	Urban		1817	213	350	216	168	17215	2573
	sum	42516	27956	4405	5092	1160	924	42919	26744

Kishangarh Bass	Rural	18099	16592	3309	4881	538	399	5768	2587
	Urban	1806	599	147	291	310	328	8728	2587
	sum	19185	17551	2456	5172	848	727	18092	4809
Ramgarh	Rural	29947	28884	4728	6966	924	426	15043	278
	Urban								
	sum	29947	28884	4728	6966	924	426	15043	278
Alwar	Rural	53228	49624	7241	10963	1887	1736	25036	6822
	Urban	790	287	262	124	1856	906	63441	8427
	sum	54018	49911	7503	11087	3743	2043	88477	17249
Bansur	Rural	38383	35336	2690	4201	1259	822	88477	17249
	Urban								
	sum	38383	35336	2690	4201	1259	822	88477	17249
Thanagazi	Rural	27687	27030	2237	3437	3497	2520	18798	8986
	Urban								
	sum	27687	27030	2237	3437	3497	2520	18798	8986
Rajgarh	Rural	44314	41768	3266	5938	17175	1079	18845	3358
	Urban	188	160	60	91	181	143	5375	878
	sum	44502	42128	3326	5938	17175	1079	18845	3358
Laxmangarh	Rural	56921	54911	2902	4289	1126	579	12230	2060
	Urban	592	474	49	182	94	67	1994	366
	sum	57513	55385	2951	4471	1220	646	14224	2426
Kathumar	Rural	40686	35874	3263	5161	879	624	10145	4947
	Urban	144	51	32	5	81	83	3642	271
	sum	40830	35925	3295	5166	960	725	13787	6218

Source: Census Office, 2011 Rajasthan

Conversely, Laxmangarh tehsil exhibits the lowest employment rate in this sector, at just 1.34 per cent. The limited job availability in Laxmangarh can largely be explained by a lack of domestic businesses engaged in handloom and carpet production. The economic activities in this tehsil are less diversified than in Thanagazi, resulting in fewer employment opportunities for the population.

The remaining tehsils within the district show employment rates ranging from 1.37 per cent to 2.63 per cent, indicating some engagement in the handloom and carpet industries, albeit at a lower scale than in Thanagazi. This variation suggests that while some areas have begun to establish domestic industries, they have not reached the same level of success or capacity as those found in Thanagazi.

To address these disparities and bolster local economies, efforts are being made to promote domestic industries through agricultural development initiatives. (Rajvansi, 2007) Specifically, there is a focused effort to encourage the growth of agriculture-based industries, which aim to provide additional employment opportunities and enhance the livelihoods of residents throughout the study area. This strategic approach is expected to gradually raise employment rates across all tehsils, fostering a more balanced economic environment. Details and statistics relevant to these findings are provided in Table 1.2.

Population Engaged in Other Activities

In addition to the previously discussed occupations, a notable segment of the population is engaged in other forms of work, collectively accounting for 27.02 per cent of the district's workforce. (Così, 2015) This diverse employment category encompasses a wide range of activities, reflecting the region's economic versatility. (Kassis et al., 2020)

Among the tehsils, Tijara stands out with the highest employment rate in this category, at an impressive 45.92 per cent of its workforce. This suggests robust engagement in alternative occupations, potentially driven by local economic conditions and opportunities. (Van den Brink et al., 2019) In contrast, Laxmangarh tehsil has the lowest participation at just 12.01 per cent, indicating that fewer

residents are involved in these other employment options, which could be attributed to various socio-economic factors.

Furthermore, many individuals living near agricultural areas tend to engage in agriculture-related businesses, either directly through farming or indirectly through support services and trade. Such participation not only bolsters the local economy but also creates interconnected networks among residents. In the remaining tehsils, the percentage of the population engaged in these other occupations varies significantly, ranging from 15.20 per cent to 45.06 per cent, reflecting differing levels of economic diversification and opportunities across the district.

Table 2
Occupational Pattern of Population in Alwar District (2011)

District/Tehsil	Farmer	Agricultural labourer	Family industry	Other functionaries
Behror	64.65	11.35	1.73	22.27
Mundawar	70.40	12.92	1.48	15.20
Kotkasim	66.15	13.28	1.70	18.87
Tijara	46.45	6.26	1.37	45.92
Kishangarh Bass	52.30	12.35	2.25	32.80
Ramgarh	65.58	13.04	1.50	19.88
Alwar	44.30	7.92	2.72	45.06
Bansur	71.99	6.73	2.13	19.15
Thanagazi	58.19	6.09	6.15	29.57
Rajgarh	69.61	7.30	2.63	22.46
Laxmangarh	81.31	5.34	1.34	12.01
Kathumar	72.48	7.98	1.60	17.94
Alwar	62.05	8.80	2.13	27.02

Source: Census Office, 2011 Rajasthan

The study reveals that a significant portion of the working population is employed as cultivators, underscoring agriculture's importance to the local economy. Among cultivators, other forms of employment are present, but agricultural labour ranks third, underscoring its vital role in providing livelihoods. Interestingly, the smallest segment of the workforce is found in family-based industries, indicating a potential area for growth and development.

To elevate the overall standard of living within the district, it is imperative to create and promote diverse employment opportunities. A strategic approach would focus on cultivating and enhancing the district's primary crops. By doing so, we can not only bolster agricultural employment but also stimulate related sectors that support agricultural activities.

Moreover, improving irrigation facilities emerges as a critical factor for agricultural advancement. Reliable and efficient irrigation systems can directly influence crop yields and overall productivity. Furthermore, the adoption of modern agricultural practices, such as chemical fertilisers, appropriate pesticides, and high-yield, improved seed varieties, can significantly enhance productivity.

These strategies and their implications are further detailed in Table 3, which illustrates the potential benefits of targeted agricultural development initiatives.

The working population in the district accounts for 32.10 per cent of the total population, indicating significant engagement in various forms of employment. Within this working group, 14.40 per cent are classified as marginal workers, a category that includes individuals who participate in agricultural and other productive activities for less than 183 days each year. (MoHFW, 2005) This group can be considered semi-unemployed, as their work is inconsistent throughout the year. (MoHFW, 2007) According to the 2011 census data, there were approximately

511,099 marginal workers in the district, accounting for 13.90 per cent of the overall population. (Task Force on Skill Development, 2007)

Non-working individuals account for 53.49 per cent of the population, highlighting a notable segment not engaged in economic activity. When examining the distribution of non-working individuals across various tehsils within the district, it is evident that Alwar tehsil has the highest proportion, with 58.75 per cent of its population classified as non-working. In contrast, Kotakasim tehsil records the lowest percentage in this category, with 45.52 per cent being non-working. Furthermore, Kishangarh Bas tehsil shows a substantial proportion of non-working individuals at 55.39 per cent, while Ramgarh tehsil follows closely at 53.09 per cent. This data reveals varying levels of economic activity across the district's tehsils and underscores employment-related challenges in the area.

Table 3

Functional, Marginal and Non-Working Population (2011) (in percentage)

District Tehsil	Functional	Marginal	Non-Functional
Alwar	32.48	8.77	58.75
Behror	34.06	15.20	50.74
Mundawar	31.68	17.22	51.10
Kotkasim	27.27	27.21	45.53
Tijara	31.94	13.60	54.46
Ramgarh	32.19	13.82	53.99
Kishangarh Bass	31.84	12.77	55.39
Bansur	33.09	17.14	49.77
Thanagazi	31.17	15.00	53.83
Rajgarh	32.06	14.94	53.00
Laxmangarh	34.30	14.57	51.13
Kathumar	28.90	18.28	52.82

Source: Census Office 2011, Rajasthan

Conclusion

The socio-economic landscape of a region is often mirrored in the characteristics of its working population. An analysis of the 2011 census data for Alwar district reveals that only 32.10% of the district's total population was employed. This figure highlights a concerning trend of underemployment: 14.40% of the workforce are classified as marginal workers—individuals who work fewer days or less than half the year. Moreover, a notable 53.49% of the population is designated as non-working, indicating a significant portion of the community not actively engaged in the labour market.

When examining the district at the tehsil level, Alwar stands out with the largest non-working population, underscoring the challenges faced in this area. In contrast, Kotkasim tehsil holds the highest percentage of marginal workers, at 27.21%, illustrating a localised pattern of precarious employment.

On a more positive note, Laxmangarh tehsil has recorded the highest proportion of employed residents at 34.30%. A substantial portion of this workforce is employed in the agricultural sector, which accounts for 62.05% of employment—indicating a heavy reliance on farming as the primary means of livelihood. Additionally, farming labourers account for 9.11% of the working population. Beyond agriculture, 2.13% of individuals are involved in family and domestic industries, while the remaining 27.02% are engaged in diverse occupations, illustrating the region's varied economic activities.

Despite the considerable agricultural dependence, the region's overall per capita income is categorised as medium. This economic status is largely influenced by employment patterns and an overwhelming

reliance on agriculture, which is subject to seasonal variations and market fluctuations.

The high proportion of non-working individuals in Alwar district presents a pressing concern that could hinder local economic growth and social development. However, it's crucial to note that Alwar district has strategic advantages due to its incorporation within the Delhi-NCR and its location along the Delhi-Mumbai Mega Highway. This advantageous positioning is expected to foster the development of new industrial centres, which could generate substantial employment opportunities and contribute to an improved economic outlook for the district. With the anticipated growth in industrial activity, there is potential for significant positive shifts in Alwar's economic landscape in the foreseeable future, provided that measures are taken to enhance workforce participation and skill development (World Bank, 2006).

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Exploring the Patterns of Ageing Population and Chronic Diseases in India's Demographic Landscape

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Abstract

Population ageing is an ongoing and comprehensive process occurring both in India and globally. India is currently experiencing a significant demographic shift characterised by a sharp decline in death rates and a low birth rate. This situation has resulted in a dual burden of population growth and ageing pressures on the country. During the epidemiological transition, India has effectively managed communicable diseases in recent years. However, as the country advances, it faces a growing challenge related to non-communicable diseases, particularly chronic illnesses, which are now prevalent. To promote good health and well-being, it is crucial to assess the profiles of the ageing population and their chronic diseases. For this purpose, secondary data from reliable sources are collected, and a simple percentage method is used to visualise spatial patterns of chronic diseases. States such as Kerala, Karnataka, Goa, and Punjab show significantly higher disease prevalence than the national average across India.

To address these challenges, accessible, affordable, and technology-enabled specialised treatments should be made available for the elderly population throughout the country. Implementing a healthcare policy that emphasises specialised caregiving services will enhance the overall well-being of older adults, contribute to a healthy and happy ageing population, and ultimately promote a healthier nation.

Keywords: Ageing, anaemia, chronic diseases, hypertension, population growth

Introduction

The ageing population in India is a significant demographic trend with wide-ranging implications. Studies show that India is shifting towards an older age structure, with the proportion of people aged 60 years and above expected to increase substantially by 2050 (Nayak & Bagchi, 2017; Panda & Mohanty, 2022). This transition is not uniform across the country, with states such as Kerala, Tamil Nadu, Odisha, Karnataka, Andhra Pradesh, Gujarat, and West Bengal identified as at greater risk of population ageing (Raju, 2014). The growing elderly population poses challenges, including higher old-age dependency, greater vulnerability due to low literacy levels, and the need for expanded economic and social support systems for the elderly (Subaiya & Bansod, 2014). The ageing population in India is facing a rising burden of chronic diseases,

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with significant disparities in diagnosis, treatment, and prevalence across demographic groups and regions. Studies indicate that around 46.1% of adults aged 45+ report at least one chronic condition, with a high proportion remaining untreated, especially among the poorest quartile (Sanjay et al., 2023). The elderly experience high rates of multimorbidity, with 32.96% affected, and women show higher prevalence of conditions such as arthritis and hypertension (Sharma & Maurya, 2022). Multiple chronic conditions (MCCs) among the elderly exacerbate health care inequalities, leading to higher out-of-pocket expenses and challenges in accessing health care (Shukla et al., 2023). Moreover, chronic diseases such as hypertension, diabetes, and heart disease are prevalent among older adults, with rates varying by gender and living arrangements (Rashmi & Mohanty, 2023). Urban-rural disparities persist, with urban residents more likely to have chronic diseases, influenced by factors such as education, wealth status, and marital status (Chauhan et al., 2022). Another study found that urban areas have a higher incidence of chronic diseases, with 29% of elderly individuals affected compared to 17% in rural areas (Jana & Chattopadhyay, 2022).

Need for the Study

Ongoing worldwide demographic transition and increasing life expectancy have led to ageing populations in every country, including India. The population is growing, the ageing demographic is expanding, and the burden of disease is rising in parallel. Currently, non-communicable chronic diseases are prevalent across all age groups. Special care is required for the elderly population (aged 60 years and above) to address the rising frequency of chronic diseases, given their physical and mental vulnerability. Achieving good health and well-being (Sustainable Development Goal 3) globally and in India requires assessing the spatial patterns and scenarios of chronic diseases. Unfortunately, no studies have explored the state-wise prevalence of chronic diseases among the elderly in India. Therefore, this paper aims to envision spatial disease patterns and the chronic disease scenario across the nation.

Objectives of the Study

The present study deals with the following objectives:

To analyse the trends of the ageing population in comparison to the total population in India.

To study the regional patterns of the ageing population in the study area.

To identify and characterise the patterns of chronic diseases among the ageing population in India.

Materials and Methods

Database

The present study is based on the "Longitudinal Ageing Study in India (LASI), Wave-1" report published by the National Programme for Health Care of the Elderly and the International Institute for Population Science in 2020. It surveyed 72,250 individuals aged 45 and above (31,464 of whom were 60 and above) across 35 states and union territories of India (excluding Sikkim). The study comprehensively analysed the regional patterns of the ageing population and their health and well-being characteristics, focusing on prevalent chronic diseases such as Cardiovascular Diseases, High Cholesterol, Diabetes Mellitus, Anaemia, Chronic Lung Diseases, and Bone/Joint Diseases. The analysis excluded diseases with low sample sizes and considered data from 28 states (excluding Sikkim and union territories).

Methods

To analyse and depict the regional patterns of the ageing population (aged 60 years and above) and their chronic health conditions, simple percentages and self-reported rates of diagnosed diseases have been mapped, and spatial analyses have been conducted using cartographic tools and QGIS.

Results and Discussion

Changing Trends and Patterns of Ageing Population in India

Figure 1 illustrates the unusual growth rates of the ageing population (AGR) and the total population (TGR) in India. Between 1951 and 1961, the TGR was 21.6%, while the AGR was 23.6%. From 1961 to 1971, the TGR rose from 21.6% to 24.8%, with the AGR increasing from 23.9% to 33.7%. This irregular rise in both TGR and AGR can be attributed to the partition of India, which led to an influx of illegal migrants from Pakistan and Bangladesh. According to the 1951 Indian Census, there were a total of 7.30 million immigrants, including 4.70 million from West Pakistan and 2.55 million from what is now Bangladesh (Visaria, 1969).

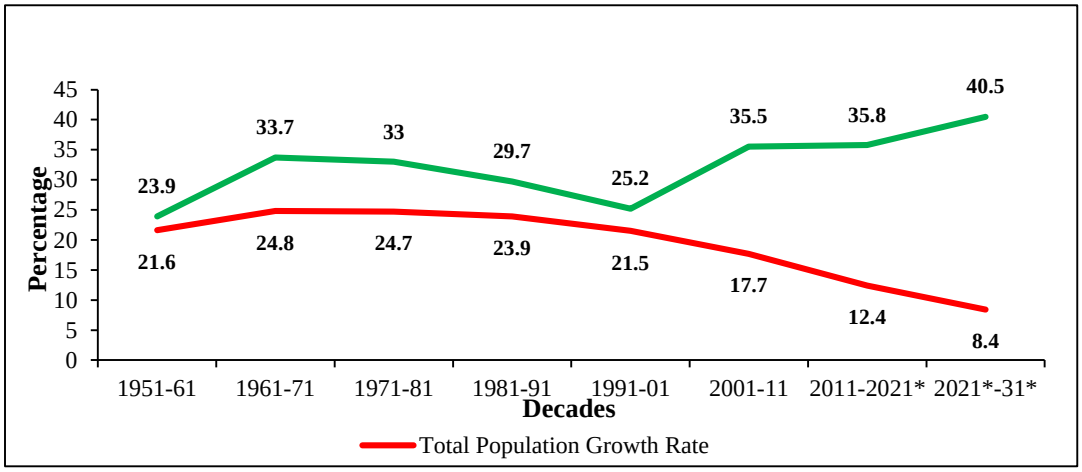
After 1971, the TGR decreased, falling to 17.7% between 2001 and 2011, and is projected to reach 8.4% by the 2031 census (Census of India, 2019). This decline in the birth rate is attributed to increased public awareness, government-led birth control campaigns, rising literacy rates, and low child mortality. Conversely, from 1971 to 2001, the AGR gradually declined due to factors including poverty, food crises, war, low literacy rates, the spread of vector-borne and waterborne diseases, and the emergence of life-threatening chronic and non-communicable diseases. Additionally, there was a lack of health awareness, a low quality of life, and frequent emergency declarations in India. Since 2001, however, the AGR has steadily increased due to a continued decline in the death rate, economic growth, industrialisation, rising life expectancy, significant advancements in medical science, job opportunities, poverty reduction, improved literacy rates, urbanisation, health awareness, and better healthcare facilities and policies (Sahoo et al., 2023). It is projected that the AGR will reach 40.5% by 2031 (NSO, 2021).

According to the 2011 census, the elderly population (aged 60 years and above) accounted for 8.6% of the total population. This figure is expected to rise to 10.1% in 2021 and reach 13.1% by 2031 (NSO, 2021). There is significant interstate variation in the distribution of the elderly population across Indian states. Figure 2 shows the interstate distribution of the ageing population based on data from the Sample Registration System. Himachal Pradesh, Odisha, Kerala, and Tamil Nadu have an elderly population share greater than 10% of their total population. Factors such as high migration, increased life expectancy, the proliferation of nuclear family systems, high literacy rates, a good quality of life, improved healthcare systems, healthcare policies, and healthier diets contribute to longer life spans.

Currently, Tamil Nadu, Kerala, and Himachal Pradesh are the three states with the highest proportion of elderly residents in India (Sahoo et al., 2023). Conversely, Uttar Pradesh, Bihar, Jharkhand, Chhattisgarh, and Assam have less than 7% of their population in the ageing demographic. The remaining states show ageing population growth rates between 7% and 10%. About 19% of states have an ageing population growth rate exceeding 10%, while 26% have a growth rate below 7%. Approximately 55% of states have ageing population growth rates between 7% and 10%. This evident trend indicates a substantial and rapid increase in the ageing population, posing significant challenges for healthcare services, morbidity, mortality, and related aspects in India in the coming years.

Figure 1

Decadal Growth Rate of Total and Elderly Population in India



*Projected figure

Source: Population Census Data and Report of the Technical Group on Population Projections November 2019, Population Projections for India and States 2011-2036, Census of India 2011

Regional Patterns of Chronic Diseases among Ageing Population in India

In India, cardiovascular diseases are prevalent among the elderly population (60 years and above) among all chronic diseases. They account for a 34.6% share of the national average, followed by bone/joint diseases (18.8%), diabetes mellitus (14.2%), chronic lung diseases (8.3%), anaemia (4.7%), and high cholesterol (2.5%). Hypertension (32%) is the main disease, followed by heart disease (5.2%) and stroke (2.7%) among cardiovascular diseases at the national level. Among the bone/joint diseases, arthritis (10.7%) is predominant, followed by rheumatism (7.6%) and osteoporosis (1.3%). On the other hand, among chronic lung diseases, the prevalence of asthma accounts for 5.9%, chronic obstructive pulmonary disease for 2.8%, and bronchitis for 1.6% at the national level.

Cardiovascular Diseases

Cardiovascular diseases (CVDs) are conditions affecting the heart and blood vessels, including hypertension, stroke, and heart disease. Fig. 3 shows inter-state variation in CVDs; Goa (60.3%) has the highest prevalence, while Nagaland (16.0%) has the lowest, with a national average of 34.6%. Jammu & Kashmir, Himachal Pradesh, Punjab, Haryana, West Bengal, Assam, Maharashtra, Telangana, Andhra Pradesh, and Kerala have higher case rates (above 40%). In contrast, Madhya Pradesh, Uttar Pradesh, Chhattisgarh, and Nagaland have lower rates (below 25%), while the remaining states account for 25% to 40% of cardiovascular disease cases among the elderly in India. Hypertension is prevalent across all states in India, and there is a clear correlation between higher prevalence of hypertension and increased occurrence of CVDs among the elderly in India. Most CVDs and diabetes are caused by obesity, unhygienic dietary habits such as low intake of fruits, vegetables, and whole grains, smoking, physical inactivity, alcohol consumption, raised blood pressure due to excess salt intake, overweight, heredity, hyperlipidaemia, and stress.

Table 1

Spatial Patterns of Chronic Diseases among Ageing Population (60 years and above) in India, 2017-18

State	Self-reported prevalence (%) of diagnosed					
	Age ≥ 60					
	Cardiovascular Diseases[1]	High Cholesterol	Diabetes Mellitus Disease	Anaemia Disease	Chronic Lung Diseases[2]	Bone/Joint Disease[3]
India	**34.6**	**2.50**	**14.2**	**4.7**	**8.3**	**18.8**
Andhra Pradesh	46.5	1	20.8	2.7	9.8	22.4
Arunachal Pradesh	26.6	0	8.2	[2.7]	4.2	13
Assam	41.8	0.5	8.8	2.1	4.7	4.7
Bihar	28.1	1.6	8.2	8.3	6.6	12
Chhattisgarh	20.9	[0.2]	9.2	5.7	3.5	9.2
Goa	60.3	9.3	27.3	3.9	3.8	15.9
Gujarat	34.2	3.7	17.6	8.3	8.7	20.4
Haryana	41.9	2.1	10.5	3.1	9.1	9.6
Himachal Pradesh	42.7	4.9	16.1	8.1	5.1	14.1
Jammu & Kashmir	51.2	3.6	9.4	5	7.6	27.1
Jharkhand	27.7	0.4	12.3	1.8	3.8	8
Karnataka	35	2.9	19.1	10.2	10.4	24.5
Kerala	57.1	26.8	34.7	3.8	11.9	28.2
Madhya Pradesh	23.1	0.3	7.9	6.5	8.4	10
Maharashtra	41.1	1.5	16.6	3.9	7.3	26.2
Manipur	32.7	4.4	10.6	1.5	3.9	4.6
Meghalaya	36.2	[1.2]	5.9	[0.7]	1.2	3.7
Mizoram	33.2	1	11.4	3.6	8.6	8.8
Nagaland	16	[0.7]	7.8	[0.6]	1.2	3.2
Odisha	28.2	1.5	9.9	2.9	4.7	17.4
Punjab	46.8	12.8	20.2	8.2	5.4	11.8
Rajasthan	32.7	1.1	9.3	3.8	15	14.8
Tamil Nadu	36.8	3	25.5	1.7	7.3	25.2
Telangana	44.1	[0.4]	15.6	0.5	5.6	32.7
Tripura	40.4	[1.1]	11.9	1.9	9.3	10.5
Uttar Pradesh	22.4	0.7	8	4.6	7.5	9.2
Uttarakhand	30.2	0.6	10.4	3.5	7.8	15.6
West Bengal	43.2	1.8	13.3	1.6	10.9	31.6

Source: *Compiled by authors based on the data collected from Ministry of Health and Family Welfare, Government of India, Longitudinal Ageing Study in India (LASI) Wave-1, 2020*

Notes:

"[]" based on fewer than 5 unweighted cases in the numerator or 25 unweighted cases in the denominator

"-" indicates less number of cases/no cases

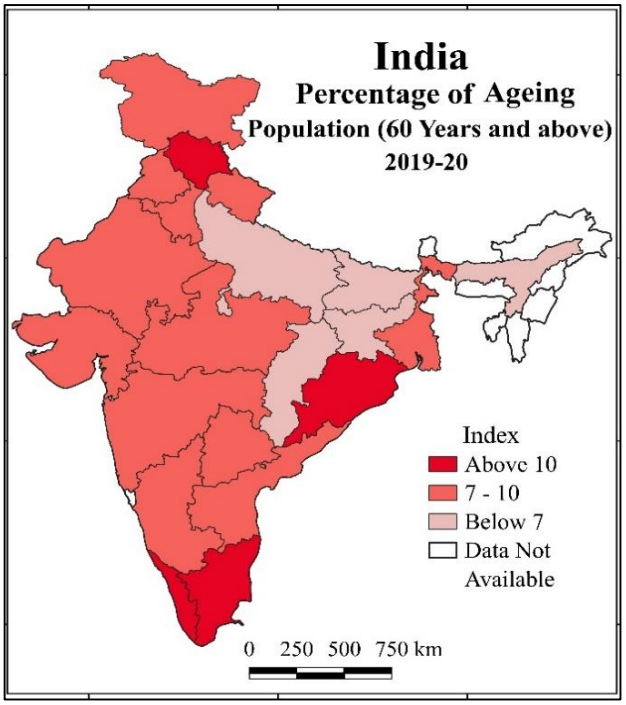
For all chronic conditions, the reference period is ever diagnosed and diagnosed by MBBS, BDS and AYUSH health professionals

[1]Cardiovascular diseases (CDVs) include hypertension, heart diseases and stroke (any one or more)

[2]Chronic lung diseases include chronic obstructive pulmonary disease (COPD), asthma and bronchitis (any or more)

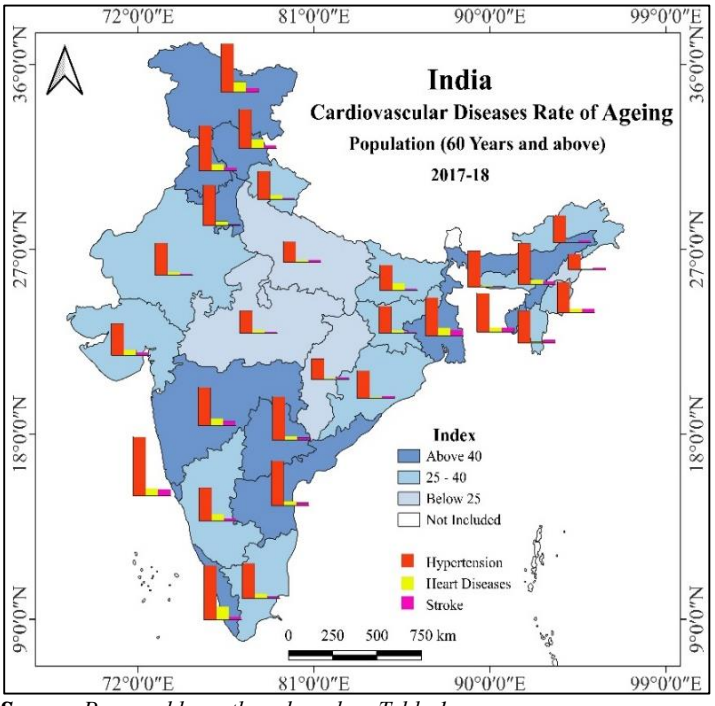
[3]Bone/Joint diseases include arthritis, rheumatism, and osteoporosis (any one or more)

Figure 2



Source: Based on the Data collected from the Sample Registration System, Registrar General and Census Commissioner of India, 2020

Figure 3



Source: *Prepared by authors based on Table 1*

Figure 4

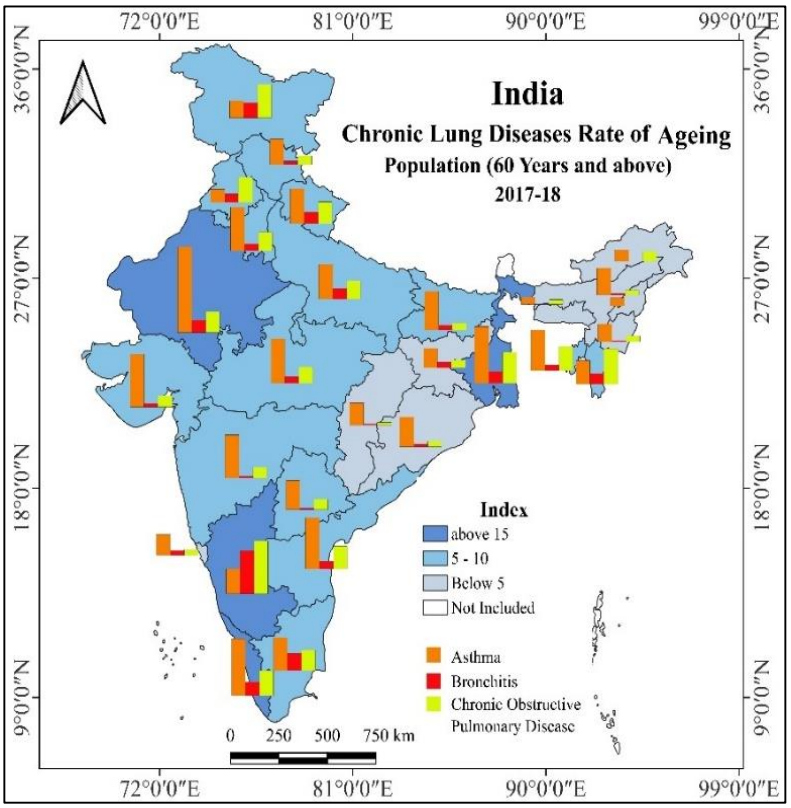
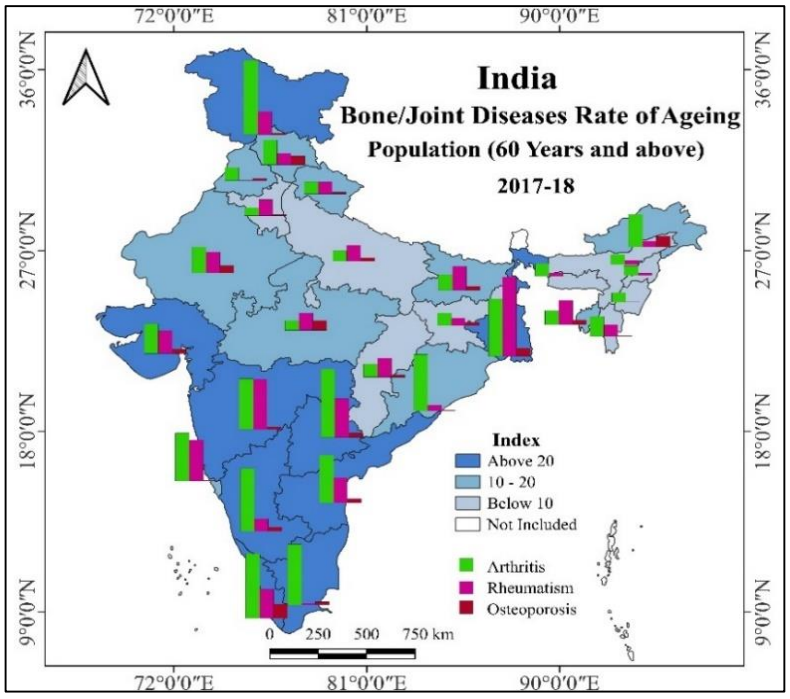


Figure 5



High Cholesterol Disease

Too many lipids in the blood lead to high cholesterol. Table 1 shows the high-cholesterol disease profile of Indian states, and almost 46% of states have a higher incidence of high-cholesterol disease than the Indian average (2.5%). Kerala (26.8%) has the highest incidence, whereas Chhattisgarh (0.2%) has the lowest, and Arunachal Pradesh (0%) has no cases of high-cholesterol disease among the ageing population in India. Inter-state variation is evident, with Punjab and Kerala having incidence rates above 10%. In contrast, Goa has a 5%-10% incidence, and the remaining states have fewer than 5% cases of high-cholesterol disease among the ageing population in India.

Diabetes Mellitus

Diabetes mellitus occurs when the body is unable to absorb insulin effectively. About 36% of states have reported a higher prevalence of diabetes mellitus than India's average (14.2%), and Kerala (34.7%) ranks first, whereas Meghalaya (5.9%) ranks bottom in the occurrence of diabetes mellitus. Punjab, Goa, Kerala, Tamil Nadu, and Andhra Pradesh have greater than 20%. Jammu & Kashmir, Rajasthan, Madhya Pradesh, Uttar Pradesh, Chhattisgarh, Odisha, Bihar, Meghalaya, Assam, Arunachal Pradesh, and Nagaland have less than 10% of diabetes mellitus cases among the elderly population in India. In contrast, the remaining states have 10%-20% of cases (Table 1).

Anaemia Disease

Punjab, Himachal Pradesh, Gujrat, Madhya Pradesh, Bihar, and Karnataka states have more than 6% cases of anaemia disease due to dietary risk and poor wash condition, diabetes, high consumption of alcohol and drug leads anaemia among the elderly population in India (Indian Council of Medical Research India, 2017), whereas, Tamil Nadu, Telangana, Andhra Pradesh, Odisha, Jharkhand, West Bengal, and all North-Eastern states (except Mizoram) have 3%-6% incidence of anaemia among elderly population in India. Anaemia is not severe among the Indian elderly population, as 29% of states have a higher incidence of anaemia than the national average (4.7%). Karnataka (10.2%) has the highest and Telangana (0.5%) the lowest occurrence of anaemia among the elderly population in India (Table 1).

Chronic Lung Diseases

Chronic lung diseases affect the airways and other structures of the lungs, including asthma, bronchitis, and chronic obstructive pulmonary disease (COPD). It is an incurable disease. Rajasthan (15%) has the highest incidence of CLDs, and Nagaland (1.2%) the lowest. Fig. 4 reveals that Rajasthan, West Bengal, Karnataka, and Kerala have more than 15% of cases due to higher air pollution (Indian Council of Medical Research, India, 2017). In contrast, Chhattisgarh, Odisha, Jharkhand, and all North-Eastern states (except Mizoram and Tripura) have 5%-10% cases of chronic lung diseases among the ageing population in India. Among the CLDs, asthma is prevalent across all the states of India. Karnataka has both a higher rate of bronchitis and a higher rate of COPD. It is observed that hilly states have comparatively lower rates of CLDs due to high altitude and good air quality. (Indian Council of Medical Research, Public Health Foundation of India, 2017).

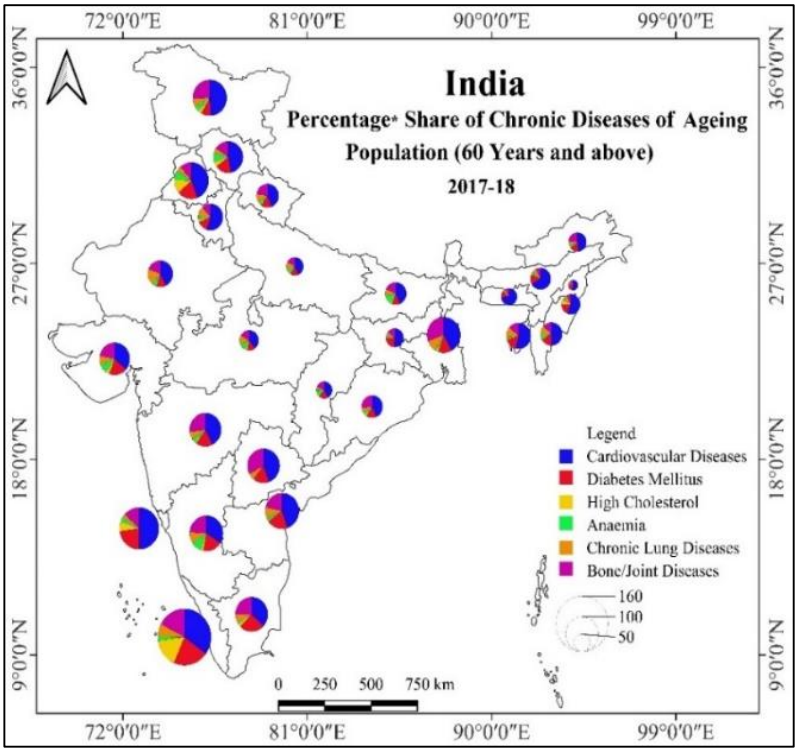
Bone/Joint Diseases

Nearly 32% of states have reported a higher prevalence of bone/joint-related diseases than the India level (18.8%), and Telangana (32.7%) leads the ranking, followed by Nagaland (3.2%). Jammu & Kashmir, West Bengal, Gujarat, Maharashtra, Karnataka, Kerala, Tamil Nadu, Andhra Pradesh, and Telangana states have above 20% events of bone/joint diseases whereas states Punjab, Himachal Pradesh, Uttarakhand, Rajasthan, Madhya Pradesh, Odisha, Bihar, Arunachal Pradesh, and Tripura have recorded 10%-20% cases of bone/joint diseases among elderly in India (Fig. 5). It is observed that southern Indian states are more prone to affected in bone/joint related diseases than northern Indian states. Among bone/joint related diseases, arthritis and rheumatism are more prevalent across all the southern Indian

states than northern Indian states (except Jammu & Kashmir).

Fig. 6 illustrates the cumulative percentage share of major chronic diseases among the elderly in India. It is observed that Kerala (total cumulative percentage: 162.5%) has the highest, and Nagaland (total cumulative percentage: 29.5%) the lowest, incidence of major chronic diseases among the elderly in India. South Indian states (Andhra Pradesh, Karnataka, Kerala, Tamil Nadu, and Telangana) and north Indian states (Haryana, Himachal Pradesh, Jammu & Kashmir, Punjab, Rajasthan, and Uttarakhand) exhibit exceptionally higher occurrences. In contrast, central Indian states (Chhattisgarh, Madhya Pradesh, and Uttar Pradesh) show exceptionally lower occurrences of major chronic diseases among the ageing population. It is evident that among the selected major chronic diseases, including cardiovascular diseases (CVDs), bone/joint diseases, and diabetes mellitus, prevalence is observed across all Indian states.

Figure 6



Source: *Prepared by authors based on Table 1*
* Cumulative Percentage Share of Major Chronic Diseases

Conclusion

Disease is an enduring global reality, and India, like other nations, grapples with its complexities. Following the epidemiological transition, India not only tackled communicable diseases but also experienced a surge in non-communicable diseases. Factors such as unplanned urbanisation, unhealthy lifestyles, tobacco and alcohol abuse, and poor dietary habits exacerbate these health challenges, particularly among the elderly who are physically and mentally vulnerable. Rising disability rates among the elderly underscore the need for early disease detection—high out-of-pocket healthcare

expenses further burden elderly households, pushing some into poverty. Access to affordable healthcare is limited, especially for conditions like cardiovascular diseases, which are primarily available in costly private facilities due to shortages and inefficiencies in public healthcare. Despite advancements in medical science, disease prevalence persists, necessitating a focus on awareness and prevention, particularly among the elderly. Authorities must prioritise advanced, accessible, and affordable healthcare systems, including routine check-ups even in remote areas. Concurrently, measures such as tobacco bans, alcohol restrictions, improved food quality, and physical fitness campaigns are vital for promoting good health among the ageing population. Recognising the elderly as custodians of culture and experience, their well-being is crucial for national progress. Thus, competent authorities must implement comprehensive strategies to ensure the sustainability and health of India's ageing population, safeguarding their invaluable contributions to society.

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