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This issue of the Journal is dedicated to Professor Surya Kant (14 December 1949–19 March 2023)

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¹ Corresponding Author

Sikhs in India Outside Punjab

Himadri Banerjee

Abstract: The essay attempts to examine certain marginalised areas of Sikh Studies. It reviews the history of more than five hundred years of Sikh dispersion beyond Punjab in India that gave rise to a few endogamous Sikh groups, many of whom have never been to Punjab and do not know Punjabi. Their gurus initiated some of these journeys during the medieval days. Still, later on, their scope was widened to the distant locations of the country, including different Sikh castes and de-territorialised them. It raises the question of whether these Sikhs may be bracketed as Indian Sikhs and points to an internal diaspora outside Punjab in India.

Keywords: Migrant workers, Kerala, Language barriers, Living conditions, West Bengal

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Introduction

More than five decades ago, Gopal Krishan (1971) published a pioneering essay in the *Indian Geographical Journal*, 'Distribution of the Sikhs Outside Punjab (India)'. The scholar emphasised a few exciting features about Sikhs residing outside Punjab. He found that the most prominent Sikh population spreads in all six states having boundaries with Punjab. These are Delhi, Jammu & Kashmir, Haryana, Uttar Pradesh, Rajasthan and Himachal Pradesh. He could trace that Punjabis/Sikhs have long traditions of internal dispersion. It was largely possible because colonial Punjab could effectively use unutilised river water going down the Indus River, harnessing these vast amounts of water to carry them over different *doabs* (tracts lying between rivers). As a result, the lands that have long been prairie waste were gradually transformed into a new healthy life. It made it possible to make the land of the five rivers into a food basket for the British Indian Empire.

Krishan (2004) also informed readers that hundreds of migrants reached the canal tracts from densely populated sub-montane and central districts like Gurdaspur, Hoshiarpur, Sialkot and Lahore. They travelled long distances on foot and participated in the newly developing British irrigational exteriors. It goes to their credit for making not only the land a model province of agrarian development in the eyes of the colonial bureaucrats but had enough potential for internal dispersal that reached a new height by the late 19th century and the early decades of the next century.

A distinct aspect of the enterprising landowners of Punjab was that they were not reluctant to serve the British-Indian Army, fought in different theatres of war beyond Punjab, and carried the message of their gurus to distant parts of the globe.

In the next five decades, Gopal Krishan engaged himself in a few allied domains, like the position of the Punjabi-speaking population's dispersion. He could establish that they were one most populous linguistic groups beyond Punjab, surpassing even the Marathis and Bengalis, who generally had better access to modern education and other opportunities (Krishan, 2020, pp.111-115).

The mobility of the Punjabi population continued to inspire other academicians in Punjab. It goes to the credit of Dutt et al. (1979), examining the different forms of Punjabi journeys in the post-Independent years. They published two articles in the *Geo-Journal* in the 1970s and emphasised that the Punjabi migrants' dispersion was so widespread that they could reach nearly all the six hundred districts of the country. Gill (1999) further examined the subject and underlined how the Sikhs' large-

scale dispersal from rural Punjab steadily transformed them into urban folk beyond the province. According to his estimate, these urban Sikhs constituted around 41.1 per cent in Delhi, Chandigarh and Mumbai.

These studies mentioned above were all undertaken by scholars of Population Studies, mostly of Punjabi background. A historian is generally conspicuous by his absence in the field—the present essay endeavours to fill in some of the existing gaps in the eyes of a historian. The study is divided into a few sections that would not only try to the historical roots of Sikh journeys with a few references to their sources.

I. Defining Indian Sikhs as perceived by a student of history: some essential features

As a result of numerous long-term urban pushes, Sikhs stood at a little over one-fifth of their population at the threshold of the 21st century (Banerjee, 2014, pp. 534-44). They are people of varied social compositions and economic backgrounds. Despite their linguistic, cultural, and territorial differences in their ranks, they have a deep commitment to the teachings of Sikh Gurus and their holy book (*Guru Granth Sahib*). Many scattered across the country beyond Punjab had never resided there but considered Amritsar the most sacred city. Again, some Sikhs were born and brought up in different western Punjab districts like Rawalpindi, Jhelum and Gujranwala but have never been longtime residents of the Indian Punjab created after the Partition of 1947. Without any appropriate term for delineating them, they may be bracketed as Indian Sikhs in the essay so that their varied links and differences with Punjab could be better understood. It is likely to facilitate their divisions into smaller groups and allows researchers to know their unique relationship with the members of the host society. Their perceptions of Sikhism were somewhat different from their counterparts living in Punjab on vital issues like *gurdwara* (Sikh sacred space), rituals like *aarti* (showing lamps before the holy texts) and the simultaneous *parkas* (opening) of the *Adi Granth* (Sikh holy text) and the *Dasam Granth* (claimed to have been composed by Guru Gobind Singh) before the *sangat* (congregation). These practices were in Punjab but were widely popular in two of the five Sikh sacred spaces. These differences point to how regional experiences played a crucial role in many Sikh rituals outside Punjab but had generally missed scholarly attention.

The study emphasises how the community's dispersal process to distant Indian locations has de-territorialised the community. It stimulates the redefinition of migrants' religious boundaries in new residential sites and prompts them to recreate home memories with simultaneous residence in two or more places. Interfacing with their descendants born in these locations away from Punjab suggests how their response to a few recent traumatic experiences of the 1980s, such as the Operation Blue Star (June 1984) and the Delhi Sikh Pogrom (October-November 1984), continue to differ, resulting in occasional sharp differences in their ranks.

Some of these issues invite interrogation regarding diaspora, inseparably associated with disparate forms of human displacement, migration, and settlement outside native places to scattered global locations. Accordingly, the essay accommodates any form of internal dispersion of a community beyond their native place in other provinces where migrants have adapted their home memory and identity (Gold, 2007, pp.171-90). Indian Sikh settlements may therefore be investigated concerning the debate and review of whether these Sikh dispersals underline the emergence of an internal Sikh diaspora beyond Punjab in India.

II. Materials for reconstructing the history of Indian Sikhs

The sources of their history are varied and scattered. Assessment of Punjabi sources, such as the *Janam-sakhis* (birth narratives), the *vars* (long poems) of Bhai Gurdas (c.1558-c.1637), the *hukamname* (orders of letters) of gurus, the numerous poetical works of Giani Gian Singh (1882-1921), and above all, Bhai Kahn Singh Nabha's (1861-1938) *magnum opus Mahankosh* are essential

starting points. These provide glimpses of medieval days' Sikh dispersal and the development of a few *Sangat's* (Sikh congregations) engaged in different activities outside Punjab.

Cautious handling of wide-ranging Persian manuscripts points to the community's scattered settlements from Pune (Maharashtra) to Patna (Bihar) and points to different categories of land grants to holy men (Metcalf, 1979, pp. 390-403; Ved Prakash, 1981, pp. 179-83; Jena, 1997, pp. 136-42). Among them who had business instincts utilised their offerings for running religious establishments, such as *akharas*, *deras*, *maths* and *dharamsalas*.

In the east, Sikhs are traced in busy urban centres, predominantly on the Yamuna and Ganga banks rivers. Their trade transactions were not unknown in the Deccan as far as Bidar (Karnataka). Appraisal of Jaipur sources emphasises that Sikhs were engaged in political negotiations and military interventions in mid-18th century Rajasthan. A few medieval Odia and Marathi materials underline the community's presence in coastal Odisha and Pune (Maharashtra), respectively (Behera, 1966; Gokhale, 1988).

Information regarding the colonial period is available primarily in census reports, district gazetteers, annual statistical abstracts, travel narratives, memoirs of British civilians and individual tourists, etc. These underline how Sikh journeys have widened their residential locations since the late 19th century. Compared to these printed materials, unpublished archival records would be less numerous, except for three decades following the beginning of World War I (1914) to the end of colonial rule (1947). As Sikhs grew politically crucial at the all-India level for the Akalis, the colonial bureaucracy became more concerned with recording their disparate activities outside Punjab.

The wide range of modern Indian vernacular sources emphasises how authors' perceptions were modified following the harrowing Punjab experiences of the 1980s, which profoundly impacted the rest of India. The vast number of creative materials in Hindi literary archives (Tiwary, 1987; Singh, 1994; Tejinder, 1990) surpasses them. Some of these materials portray how the Sikh-Hindu relationship became sensitive following the Delhi Sikh Pogrom. Non-Hindi vernaculars examine some of these issues (Goswami, 1994; Bhattacharya, 1999), but the numbers of such publications are comparatively few and far between.

Finally, Indian Sikhs' oral tradition merits attention. Despite its bias in memory use and emphasis on the subjective experiences of narrators, it represents an exciting signifier of the community's identity. These materials remain an essential mobilisation channel and introduce historians to refreshing field experiences.

III. Four-fold divisions of Indian Sikhs

Indian Sikhs' diverse ethnic backgrounds, different strategies of journeying from their native place to new home, other languages of communication, etc., result in categorisation under the following headings :

(i) Native Sikhs

Scholars of South Asian history, like Eaton (2003), point to a few widely used 'migration corridors' extending across the country. These busy communicational arteries underline a fair measure of flexibility in pre-colonial Indian society and provide glimpses of people's varied forms of connectivity and modes of circulation. Sikhism initially reached beyond Punjab through some of these channels. Sikh Gurus' interactive engagements brought their tenets within reach of commoners. In new sites, the holy men cum enterprising Khatri businesspeople, such as the Nanakpanthis and the Udasis, nurtured the embryonic faith. Small and scattered land grants cited earlier indicate how the functioning of these settlements depended upon the support of local men of different persuasions. They were predominantly non-Punjabis with roots firmly embedded in regional socio-cultural

settings. Their presence virtually dislodged the seemingly inviolable notions that early Sikhs were all Punjabis, and their journeys were often programmed in Punjab.

These Sikh passages stimulated adequate support at the local level. In different journeys across India, the early Sikhs encountered regional beliefs and practices and incorporated some of them into their local culture. They were accustomed to communicating in other languages cutting across social boundaries and carried some *padas* (couplets) of non-Sikh *bhagats* (holy men) to Punjab. Their incorporation in Sikh sacred text underlines early Sikhs' keenness to share India's other *bhakti* (devotional) traditions commensurate with the predominant thrust of Sikh scripture as enunciated by Sikh Gurus. It emphasises growing 'self-consciousness' among the Guru's Sikhs without rupturing the religious mosaic around them. Sikhs managed to replicate them in some places, while the option of other forms of redesigning in another location is not ruled out.

The centrality of the Khalsa in the mid-eighteenth century made possible the entry of soldiers and mercenaries into the Sikh fold and witnessed modifications in the transmission of Sikh heritage. They virtually ceased to be a community of mere peasants and traders. Still, acquiring wealth stimulated economic differentiation and intensified rivalry at different levels, occasionally climaxing among *misl* leaders at the apex. Udasis and Nanakpanthis joined other militarised Sikh groups. They felt no discord in combining trade and militarism in their distant journeys, allowing for a certain ambiguity about the nature and definition of the Khalsa order.

Their long settlement in scattered residential sites during pre-colonial times stimulated particular interest in some of these locations. A few emigrants preferred to reside there after marrying at the local level. Their wedlock facilitated the incorporation of the local language, food habits, dress, and other markers of regional culture. As new generations were born, they saw a burst of creativity unencumbered by doctrinal and organisation elaboration. They appreciated some of the distinctiveness of these places. It led to their participation in local celebrations and made them better prepared to share food, adopt the dress, and assimilate culture to make these a part of their everyday living. Sikhism became pluralistic with many overlapping identities. The emergence of several small indigenous Sikh groups scattered from Kashmir to Assam had their definite territorial locations. So far, five of them are traced in different parts of India: (a) Asomiya Sikhs, (b) Bihari Sikhs (also called Agraharis), (c) Odishan Sikhs, (d) Dakini Sikhs, and (e) Kashmiri Sikhs. They point out how pre-colonial Sikhs beyond Punjab in India continued to reinvent gurus' messages with interesting modifications after incorporating local experiences. Some of these indigenous groups of Sikhs were not reluctant to claim religious affiliation with their Hindu neighbours. At the same time, reports of sharp differences between them in other parts of the country are not unknown (Banerjee, 2017:430-46).

These pre-colonial endogamous groups grew from non-Punjabi ethnic folk in a regional socio-cultural montage that operated as a vital melting pot of 'local and all-India tradition' (Ecshmann et al., 1986, p. xvi). In these distant locations away from Punjab, they were engaged in dialogue with 'regional traditions', giving them the clout to 'polish' their religious beliefs and social practices. It stimulated internal pluralism and multiple discourses (Banerjee, 2007, pp. 218-56). The emergence of such minuscule Sikh clusters, with their distinct language and ritual, led to the blossoming of regional diversity in Sikhism and underlined Sikhism's growing strength and vitality while living away from it Punjab. In these locations, the message of Sikh Gurus did not survive as moribund faith, and its life was borrowed from Punjab. Still, it underlined how divergent strands of a lived religion managed to live in distant parts of India without demarcating conceptual abstractions of deviating traditions.

(ii) Punjabi Sikhs

They are the most numerous Indian Sikhs, communicate in Punjabi, their mother tongue, carry external markers of Sikhism and prefer to maintain their separate identity from that of Hindus. As peasants and militiamen, they were already scattered from Kashmir to Karnataka in medieval times,

while their skilled artisanal personnel were found busy in a few adjoining provinces of Punjab. The colonial rule opened fresh pasturages, and their early migrations began in the decades following the annexation of Punjab (1849) and the Great Uprising (1857-59). At the same time, colonial modernity stimulated conditions for large-scale internal migration of Sikhism to different canal colonies. The current military recruitment policy encouraged the emergence of a well-defined Sikh identity in Punjab and favoured their enrollment in armed and police forces. Others were called upon to lay railway lines, drive automobiles and participate in industrialisation. The unleashing of these forces generated employment opportunities among a section of rural Sikhs.

Khatri traders no longer dominated these journeys beginning in the late 19th century, but Jats flocked in large numbers and became their actual beneficiaries. Other non-Jat groups, standing at the lower rungs of Sikh social hierarchy, like Aroras and Ramgarhias, emulated Jat enterprise, though not uniformly reproducing it. Some of these developments introduced Sikhs to varied urban opportunities and exposed them to the complexities of contemporary politics at the all-India level. For example, it was not uncommon for a Jat landowner to transfer part of his ancestral holdings and use their asset for undertaking journeys beyond India (Banerjee, 1982). Such examples were not unknown among their relatives moving to distant Indian locations.

Since the late 19th century, small Sikh peasants were encouraged to migrate to some of the newly canal-irrigated central Punjab districts like Gujranwala, Lahore and Sheikhpura from the densely populated submontane districts like Sialkot, Hoshiarpur, and Gurdaspur. They flocked in thousands and stimulated a new form of internal mobility in rural society and healthy village settlements (Darling, 1925, pp. 111-132; Krishan, 2004). Later on, in the Ganganagar district (Rajasthan) in the 20th century, the same process was replicated when new agricultural settlements developed green wheat and sugar fields (Misra, 2014, pp.17-142). As the message for gurdwara reforms (the 1920s) reached Ganganagar, the local peasantry mobilised under caste leaders. Moreover, inadequate supply from the Gang Canal under the leadership of the Akalis provided a critical rallying point to forge intimate ties with a section of Sikh leadership in Punjab. Similarly, in the districts of Saharanpur, Meerut, Rohilkhand and Moradabad districts of Uttar Pradesh, the Akali struggle remained a powerful message and stimulated Jat peasant mobilisation.

In Kolkata, Sikhs were in the city during and after World War I when the city had emerged as an embarkation point for going to distant countries beyond India and witnessed the introduction of modern vehicular traffic. They found work as drivers, cleaners and conductors in private transport organisations. It would be unfair to bracket all immigrants to the city as illiterate subalterns. Contemporary British Intelligence Branch records refer to setting up a Punjabi press, bringing out daily newspapers and publishing literary magazines of different formats. Some of these creative initiatives came from Ramgarhias, adding a new cultural dimension to the city's Sikh mosaic.

Some of these creative activities owed to the beginning of the Akali struggle in Punjab. Immigrants joined the city's nationalist leadership and transformed their fight into a broad-based anti-imperial effort. Like Akalis of Punjab, Jat Sikhs, who generally supported different moves of local Congress leadership, led Kolkata's Sikh struggle. However, a few of them joined Marxist-led trade union movements. These made Punjabi Sikhs follow varied political strands but with a linked thrust of reforming *gurdwaras*. Bihari Sikhs of central Kolkata branded as untrue Sikhs faced its immediate brunt. An alarmed British administration intervened to defend Bihari Sikhs against the Akalis and turned it into an extended version of the contemporary *gurdwara* struggle. Punjabi Sikhs, however, failed to achieve their target so long as the colonial administration stood firmly behind Bihari Sikhs. Nevertheless, they captured some of the *gurdwaras* of Bihari Sikhs when colonial rule was on its way out.

The Akali struggle in its nationalist format was neither present everywhere nor received similar support in other parts of India. It did not evoke much enthusiasm in two central Indian states

(Madhya Pradesh and Chhattisgarh) owing to the absence of a sizable number of Khalsa Sikhs. Besides, they were mostly Ramgarhias employed in different government institutions. In contrast, few others were descendants of old Nihang families with intimate links to regional culture established through the marriage of local women (Singh, 2009, pp. 38-9). Hence, the message of the *gurdwara* reforms did not appeal to them. Again, the presence of Akalis at Vaikom Satyagraha (March 1924-November 1925) in the native state of Travancore (Kerala) was viewed as a 'threat' to local peace and evoked denunciation in the local press.

In Cuttack (Odisha), its anti-colonial blueprint was modified. With the support of some loyal Sikhs and a handful of Odia Brahmos, local British officials emphasised how the Akali-led *gurdwara* struggle in Odisha could be appreciably diverted from its anti-British track record in Punjab (1935). Some of these incongruous experiences underlined that the Akali-led struggle outside Punjab had regional ramifications. As Sikh migration did not occur uniformly throughout India, it provided local British administration and nationalist leadership the opportunity to modify their pronounced anti or pro-Akali stand per local needs and circumstances.

The early twentieth-century Ramgarhia caste mobilisation in Assam provides another exciting illustration. Linked with technical jobs, Ramgarhias not only reached the industrial cities of Jamshedpur and Kolkata but also went to Assam for laying railway lines - an area missed by Jat migrants owing to a lack of surface traffic. In the absence of Jats, Ramgarhias slipped into their position and claimed the highest social ranking at the local level, which was inconceivable in contemporary Punjab. They also set up a few *gurdwaras*, bracketed these institutions with their caste name and exercised control through the celebration of *gurpurabs* (celebrations associated with their Gurus) and other festivities.

With firm loyalty to British rule and reluctance to support the Jat-dominated Akali struggle of the 1920s, a section of middle-class Ramgarhia leaders learnt the significance of the *gurdwara* platform in their caste mobilisation in Punjab. With its success in Punjab, some of its counterparts carried its message to Assam. As Ramgarhias were mobilised in Brahmaputra Valley through their caste-led *gurdwaras* (Sikh sacred space), it remained a sharp relief to what Jats had long been doing with the community's sacred space elsewhere in India (Banerjee, 2013, pp. 145-72).

The long process of Punjabi Sikh dispersions prompts historians to examine how these two important Sikh castes, namely, Jats and Ramgarhias, interfered with each other in new locations and struggled to define 'orthodoxy' against other Native Sikhs (Banerjee, 2013a, pp.163-92). The vast Indian space beyond Punjab evoked various competition and anxieties, often resulting in distance, heat, fragmentation, and hierarchy in their ranks. These struggles were not restricted to two Punjabi Sikh caste groups but affected their native counterparts from Assam to Maharashtra.

As immigrants increased in number and came from dissimilar backgrounds, tensions reached new heights under colonial rule, and the post-Independence decades point no exception to it. Contradictory assertions, such as Hindu-Sikhs, *Sanatani*-Sikhs, *packka* and *kachha* Sikhs, continued to worry them outside Punjab. This created a fissure and raised speculations about whether, like Punjab, the 'streamlining' Sikhism was similarly effective in distant Indian locations.

Some of these experiences embittered the relationship between native Sikhs and their Punjabi counterparts. It was nothing unknown under the colonial rule but took spiky turns during the post-Independence years. As there were fresh opportunities for journeys during these decades, Punjabi Sikhs moved to distant Indian districts outside Punjab and to areas where native Sikhs were still significant in numbers. It not only sharpened their conflict with Asomiya Sikhs in Brahmaputra Valley but prompted them to intervene in the management and control of two *takhats* (highest seats of Sikh temporal authority) situated in two distant parts (one in Patna and the other in Nanded in Maharashtra) of the country. After a long-protracted negotiation mixed with the show of muscle and

money power at Patna, Punjabi Sikhs could achieve success. However, at Nanded, where Dakini Sikhs are numerous, Punjabi Sikhs struggled with the recently reorganised Hazoor Sahib Management Board to administer the *Sachkhand Gurdwara*, Nanded. It evoked chain reactions, unsettled a section of Dakini Sikhs, irked Punjab's apex Sikh SGPC (The Tribune, 2015, May 19) and raised specific political questions skirting the usual Hindu-Sikh relationship in the politics of both communities.

Post-Independence decades they brought a few other changes. With improvements in the road network and changes in the means of transportation, Punjabi Sikhs reinforced their control in the domain of surface traffic at the all-India level. It opened the gates of all states beyond the Vindhyas in the south. They were not merely transporters but engaged them in different industrial enterprises, the sale of electronic equipment, electrical goods, hotel business and small-scale financial operations (The Maharashtra Sikh Directory, 2010; Singh Sabha Sahayak Society Twin Cities, 2012; Karnataka Sikh Directory, 2014).

The Punjab peasants similarly moved out of their native place. The high cost of cultivable land and its short supply carried them to rural areas of Rajasthan, western Uttar Pradesh, Madhya Pradesh and Chhattisgarh. Though there are no available official figures for peasant exodus, reports from these areas indicate that farmers around the sprawling cities of Amritsar, Jalandhar and Ludhiana were exploring options in Madhya Pradesh and western Uttar Pradesh. However, Bhatinda, Faridkot, and Ferozepur peasants preferred Rajasthan and Chhattisgarh (*The Indian Express*, November 12, 2006).

(iii) Refugee Sikhs

It refers to those Sikhs who were forced to leave earlier residential locations lying beyond the country's international boundaries and reached India on three different occasions. The process began in 1947 with the coming of Sikhs from western Punjab, who represent nearly 90.0 per cent of them. Like Sikh refugees from western Punjab, another group left Sindh almost during the same period and primarily settled in Gujarat and other adjoining states. Later, two more groups, one from Burma (1962) and the other from Afghanistan (1992), joined them. With their different residential locations and dissimilar socio-economic background, these Sikhs fall into two groups, viz. agriculturists and non-agriculturists.

According to one estimate, nearly 2.5 million Sikh refugees from different western districts of Pakistan were rehabilitated in the rest of India. They represented 40 per cent of the Sikh population before the 1947 partition (Dutt et al., 1979, p.85). It led to a profound change in the Sikh demographic profile at the all-India level. A sizeable number of them were enterprising peasants who were owners of big irrigated holdings in different canal colonies of west Punjab and small agriculturists known for their diligent farming. All could not be accommodated in Punjab (Haryana was still a part of it) on lands left behind by Muslim evacuees to Pakistan.

Refugees were resettled in provinces bordering Punjab, where Sikhs were already in significant numbers. An essential segment of these Sikhs were Jats rehabilitated in rural Haryana, Rajasthan and Uttar Pradesh. While a section of them paved the way for the Green Revolution in Punjab, their counterparts residing in adjoining states had an equally impressive record. With their longtime expertise in modern cultivation techniques and productive use of canal water, they served as a model to other refugee farmers. They took up varied challenges of new settlements and struggled to change their fortune. Haryana and Rajasthan accommodated a little over forty per cent of the Sikh peasant population (2001) residing outside Punjab and shared much of the achievements of Punjab peasants.

Uttarakhand reverberated the message of the peasant's triumph. It was initially a territory afflicted with devastating malaria, unpredictable moods of nature and ravages of wild beasts over which the hill population had virtually no control. However, hard labour and improved framing

turned a significant area of the region into flourishing agricultural settlements of the country. Nevertheless, these agrarian changes had generally occurred at the cost of coercing native hill people, large-scale bio-degradation, ecological imbalance and ethnic divide. It precipitated debate regarding its long-term implications, but the success story of Sikh pioneer farmers who had taken the lead nearly seventy years ago and continued it in subsequent decades merits attention. Another narrative of peasant success came from Himachal Pradesh, mainly from three *tahsils* skirting Punjab, like Paonta Sahib. These were initially a part of Punjab's envisaged Garden Colony (the 1950s) and supplied fruits and other products to nearby factories in Uttar Pradesh.

Unlike peasant refugees of Punjab plains with broad affinities of caste and place of origin in their ranks, their counterparts in Jammu and Kashmir were men of diverse linguistic affiliations who traced their origin to scattered areas of western Punjab. They had also embraced Sikhism on diverse occasions (Singh, 1927; see Banerjee in Brill's Encyclopedia, 2017, pp. 430-33 and pp. 444-45). Some migrated from the Sialkot region (Dutt et al., 1979, pp.209; Singh et al., 2003, pp. 419) and settled in rural parts of Jammu. Others came from other bordering areas, such as Mirpur and Muzaffarabad of Pakistan-occupied Kashmir.

The history of Sikh refugees would be incomplete without referring to urban professional groups settled in different parts of India. Many took the self-rehabilitation path in scattered urban centres and trading marts along the Yamuna-Ganga plains. However, in other cases, the government allotted houses, shops and industrial enterprises, which Muslim refugees left behind. Otherwise, they were offered vacant space at a nominal price or other financial assistance like a low rate of interest to set up shops and residential plots to build houses.

Some of these facilities allowed them to live together again with their relatives. The level of urbanisation (45.48 per cent) of these people was significantly higher than their counterparts living in Punjab (17.22 per cent). While rural Sikhs outside Punjab generally concentrate in areas bordering Punjab, urban Sikhs occupy nearly all-important cities across the country. According to census reports, more than half of the urban Sikh population inhabited big urban centres like Delhi, Mumbai, Kanpur, Jamshedpur, Kolkata, Lucknow, Thane, Pune, Jabalpur and Indore.

Of all these cities again, the rise of Delhi owed much to refugees from western Punjab. Incidentally, Delhi represents the largest urban concentration of Sikhs in the country. They brought their skills and initial capital to begin another chapter of life. With their Hindu counterparts, they had added a distinct lifestyle to modern Delhi, and their visible presence is traced throughout the city (Datta, 1993, pp. 287-305). In some important resettlement areas like Lodi Colony, Punjabi Bagh, Tilak Nagar and other Trans-Yamuna settlements, they made their presence felt to their non-Sikh neighbours. The Delhi Sikh Gurdwara Management Committee (DSGMC) exhibits a powerful Sikh presence. In 1971, legislation was passed to manage different *gurdwaras* and their properties in Delhi. With the city's historical *gurdwaras* under its management (Singh, 2003) and an annual budget of around fifty million rupees, the DSGMC used to maintain its distinct stand from the SGPC in the past. However, there have been significant changes in their relationship in recent years.

Like Delhi, important Maharashtrian urban centres such as Mumbai, Thane, Pune and Nagpur also witnessed a steady rise in the migration of Sikh refugees from 41436 (1941) to 161 184 (1991). In Mumbai, they are engaged in engineering works, electronic goods, the hotel industry, the transport sector, educational institutions and other professions. An outline of the Sikh refugee's success story is communicated through the community's numerous colourful publications, holding of *Nagar kirtans* and directories. In addition, the city had more than fifty *gurdwaras*, which made the Sikh presence colourful and enriched by making it aggressively cosmopolitan in cinema and fashion design.

While a section of Sikh refugees shared Delhi and Mumbai's spectacular urban growth, Kolkata's economy did not offer significant relief to the recent immigrants. A small number of them still settled but had to operate in a restricted market where competition was stiff, and the amount of profit was not lucrative. Moreover, the local administration's engagement with the manifold problems of millions of Hindu refugees from East Pakistan (now Bangladesh) worsened matters. Amid such difficulties, a handful of refugees reached the city. They possibly looked forward to local Sikh transporters and traded in automobile parts. However, with better education and no permanent tie with Punjab, they remained like an endogamous group within the larger Kolkata Sikh space.

The arrival of many Sikh refugees in different urban locations stimulated new social equations with Sikhs from Indian Punjab who was already there. Without any early dialogue and exchange, a section of settlers from eastern Punjab preferred to maintain distance and continue reservations about their refugee counterparts. The latter were sometimes viewed with suspicion as undesirable outsiders (Chandra, 1976; Kaur, 2007). A few Sikh sacred spaces (*gurdwaras*) sprang up with various caste and territorial affiliations, which were consolidated as centres of different group activities, giving local Sikh space a distinctiveness and 'visibility' in the eyes of their host society (Jacobsen, ed., 2008). It created competition and intensified fragmentation and hierarchy in their ranks.

Compared to refugees from Pakistan, and Punjab, their counterparts from Burma and Afghanistan are insignificant. They were mostly traders who had migrated from those districts in western Punjab. After the nationalisation of trade in Myanmar (1962) and the dislodgment of the Najibullah government in Afghanistan (1992), they moved towards India. Of these two Sikh groups, those from Afghanistan were more numerous and mostly located in Delhi (Khurana, 2001). However, the displaced Sikhs from Myanmar initially stayed in Imphal and Moreh (Manipur) and from there, they continued old trade transactions. However, fresh ethnic violence along the Indo-Myanmar border (Banerjee, 2012) forced them to leave these places. Nevertheless, they carried some distinctive features of culture and festivities of these two faraway countries and preferred social networking with those who preferred to maintain similar memories of an old home lying beyond India's international boundaries.

These refugee groups had different perceptions of home. In the eyes of refugees from western Punjab, their native place (*Ghar*) was still located in those Punjab districts, which they had to leave behind following the partition of Punjab. Despite their unremitting Sikh identity, long residence in western Punjab districts made their language, dress, food consumption, culinary process, lifestyle, and celebrations significantly different from those of their eastern counterparts. The former would be feeling more comfortable in negotiating a marriage or sharing social anxieties with their refugee neighbours and friends residing in the same locality or other parts of the country than those Sikhs who were from eastern Punjab. Similarly, the Sikhs from Burma and Afghanistan had their slightly distinct lifestyle and festivities, which historians engaged in charting them in different parts of the country would not be missing.

(iv) Dalit Sikhs

Dalit Sikhs living outside Punjab in India may be divided into two groups and stand at the bottom of the Sikh social hierarchy. One of them is Mazbhis (sweepers) of rural Punjab who immigrated overwhelmingly towards north-east India. The other is Sikligars (polishers of weapons), who represent a segment of the larger nomadic tribes composed of Banjaras, Lubanas and others. Their oral traditions trace origin to blacksmiths of Chittor of medieval Rajasthan, and, like Mazbhis, they reside in secluded sites and share the stigma of untouchability. They journeyed beyond Punjab through several channels of their will though Mazhbi migration received enough British support (Banerjee, 2010, pp. 3-30).

Mazhbhis (Sikh untouchables) of Gurdaspur and Amritsar districts were encouraged to travel to Shillong, the capital of British Assam, by the end of the 19th century to keep the city's adjoining cantonment clean. Initially, it took nearly seven days to reach there. On the recommendation of local military officials, they were subsequently employed in large numbers by Shillong Municipal Board (1910) with an assured monthly salary. It stimulated more significant Mazbhi migrations from Punjab accommodated in two specific localities of Shillong. As the hill city witnessed expansion in the following decades of the century, the number of Sikh sweepers proliferated.

Other Sikh castes like Ramgarhias, Soniars (goldsmiths), and Chimbais (calico printers) also flocked there. It led to the foundation of a *gurdwara* (1922), but Mazhbhis were denied entry to its innermost precincts of untouchability. A decade later, Mazhbhis decided to have a sacred space recreating contemporary Punjab's caste scenario in faraway hills. However, there was very little change in their social position as they continued to perform traditional menial services in their new home.

As the years rolled on, the Sikh caste scenario in the hill city grew more competitive and complicated. The leadership of the community passed from the hands of Ramgarhias to Soniars in the second half of the 20th century, who seemed more obdurate in enforcing the Sikh code of conduct within the limits of the most important *gurdwara* situated at the heart of the city. Dalits were criticised not only for coming to Sikh sacred space in an inebriated condition but also for using filthy language there. It intensified distance not only among different Sikh castes but also among fragmented Masis (Dalits converted to Christianity). Soon they found among them a small number of 'Good Mazhbhis' who were ready to rally behind Soniar leadership, while those who had refused it was treated as 'Bad Mazhbhis' and denied financial support extended to their counterparts.

It underlined that, like Punjab, the Sikh space of the hill city was not only fractured but became hierarchical to redesign it by the dominant caste's notion of purity and pollution. The plight of Mazhbhis grew worse because they did not have any legal right over the small plot of land they had been residing in since their first coming to Shillong. Some who had retired from municipal services were deprived of pensions and other benefits of working in a civic body run with governmental support.

Their position seemed nothing better in Guwahati and Dishpur in the new province of Assam, which had emerged after the dismemberment of the old British Assam (1971). So, Mathis was encouraged to move there to take up the task of keeping the new Assam capital clean. Initially, they were welcomed to emigrate, but by the beginning of the new century, the local administration seemed unwilling to accommodate any more Mazhbhis within the city's limits. Besides, some of their settlement sites, which were earlier outside the city's boundary, were incorporated within the city limits and became locations of costly residential sites, bringing them face to face with the growing pressure of consumer-friendly urbanisation.

At the beginning of the new century, the civic body looked forward to removing these 'unclean' residential places and their inhabitants who earlier were welcomed to reside to keep the urban space clean. However, with eviction looming significantly in their residential areas, Mazhbhis could neither procure any alternative accommodation nor consider returning to Punjab. In the meantime, many significant changes have occurred since their predecessors left the place nearly a century ago.

Like Mazhbhis, Sikligars did not migrate in one direction but scattered from Maharashtra to Uttar Pradesh and Himachal Pradesh to Andhra Pradesh. There is no detailed record of their dispersion, but a few field investigations of the last few decades conducted by anthropologists, journalists and the National Commission for Minorities point to their scattered locations. In recent years, they have preferred to become sedentary, embracing occupations of jewellers, ironsmiths and construction workers. Economic differentiation among a section of Sikligars is visible in some parts

of Maharashtra. It led to their social differentiation, new group divisions and social hierarchy. They are also treated differently by the various state governments. Despite occasional economic success stories, they stand away from the larger sections of Sikh society and, like Mazhbis, carry their subordinate position in new residences away from Punjab.

IV. Indian Sikhs and Punjab tragedy

As Sikhs from Punjab continued their Indian journeys, they passed through decades of tumultuous Punjab experiences in the 1980s. These turned Punjab bloody, twisted the politics of the community, and forced a handful of the community to take up arms and become targets of attacks from different corners. Their tragedy was internationalised and stimulated a new Sikh identity which evoked complicated repercussions in Indian politics.

Of the four different Indian Sikh groups, the response of Punjabi Sikhs was the most forthwith, for many had intimate contact with rural Punjab in 1984. They made no secret of their pain and anguish regarding the military assault on the Golden Temple Complex. It marginalised them in Indian polity; the Sikh Pogrom (1984) widened the chasm and alienated many of them from the rest of the country. As a result, few went back to Punjab, wishing never to return to their old settlement sites located outside Punjab. Many openly talked of another partition of the country while others suffered long-term imprisonment and other forms of police harassment. These unfortunate developments gave rise to a new Sikh ethnicity in the country (Gupta, 1996).

Despite widespread sympathy and support, Indian Sikhs did not respond uniformly—many emphasised differences with those voicing the message of Khalistan in Punjab and overseas. Neither the majority of indigenous Sikhs nor their refugee counterparts nor those from Dalit groups were ready to bracket them with the politics of secession in Punjab. Besides, others were far from their native place or had never resided there. Even a significant section of Punjabi Sikhs, who were long residents in different Indian locations, were not unaware of the significance of their present residential sites. These were viewed as new homes, and they were hardly ready to exchange these places with the 'imagined notion of Khalistan', which was unclear to many.

A few interesting literary creations by Punjabi Sikhs and non-Sikh authors were brought out during these days. They outlined Indian Sikhs' complex mindset. Those Punjabi Sikhs who had written in Hindi underlined sympathy and solidarity with widespread Sikh victimhood. There were a few non-Sikh authors who graphically documented the sufferings of the Sikhs in other Indian languages. In their opinion, religious minorities like Sikhs, who had witnessed repeated evictions from their ancestral homes, would continue to suffer at the hands of the country's majority community. However, they were not reluctant to share the pain and anxiety of their Sikh neighbours. A few non-Sikh critics held militant Sikhs of Punjab primarily responsible for recent tragedies and found no reason to support the cause of Khalistan.

These different shades of modern Indian vernaculars had another distinguishing feature. Instead of highlighting the Sikh past of Punjab, long associated with the glories of Gurus, martyrs, military heroes and crown heads since the dawn of nationalist writings in the late 19th century (Banerjee, 2013b), this literature sought to evolve a new literary space for Indian Sikhs. Uninterrupted Sikh bleeding of these years made authors conscious of the presence of Indian Sikhs as neighbours, which had so far been ignored in literary archives. A few lively images of Sikh commoners with their everyday success and failure emerged out of these tragedies of Punjab and their fallout in the rest of India. The struggle for Khalistan had no doubt partially eroded post-colonial Indian plural polity, but some of these literary creations gave rise to fresh opportunities for dialogue and debate among cross-sections of Sikhs and non-Sikhs which had not been there before.

V. A Sikh diaspora within India

These Sikh settlements add a new territorial space in the community's life and point to the emergence of a Sikh diaspora in India. By the end of the last century, demographers (Singh, 1968, pp. 68-71;

Krishan, 1971, pp. 35-41) traced their overwhelming presence in all five states adjoining Punjab (Haryana, Rajasthan, Delhi, Himachal Pradesh and Jammu & Kashmir) and Uttar Pradesh which had common boundaries with the province till the latter's trifurcation in 1966.

Their number significantly reduces as one moves away from Punjab to frontier locations in the extreme northeast or towards the far south. Their extended residence in remote places with slender Punjab links has stimulated the inclusion of many distinctive features of a new home and made them unique as Sikhs. These sites nowadays accommodate more Sikhs than their counterparts residing overseas, and unlike the latter, it is not a recent development but has grown over centuries since the days of Sikh Gurus in medieval times. Immigrant Sikhs carry home memories, viz. food, caste hierarchy, and gurdwara-centric religious life with factional politics, social celebrations, print culture and other things to new locations.

These locations, composed of different ethnic groups of mixed territorial backgrounds, challenge the notion of a static, fixed and monolithic Sikh identity and point to the community's enthusiasm to accommodate and assimilate diverse local social experiences and religious beliefs without rejecting the perception of remaining disciples of Sikh Gurus.

Like the SGPC, Indian Sikhs miss the advantage of having an apex body of their own. Instead, they have set up a few provincial-level Sikh bodies, which often communicate in sometimes contradictory languages and create differences in their ranks. However, it allows historians to examine the causes of their multi-vocalic message resonating from Manipur to Maharashtra.

Many Indian Sikhs in Delhi, Mumbai, Bengaluru and other places are adequately successful in finance and politics. However, they still lack adequate representation in the Sikh's apex agency, the SGPC. It has resulted in their silent cold war with the apex Sikh body on the nature and exercise of control over the two powerful *takhats* (seats of temporal power at Patna and Nanded) that stand outside Punjab. These unfortunate developments continued to rock the Indian Sikh space and turned it into a contested terrain (Indian Express, 2015, May 12). It sometimes flares up but mainly results in a whimper because none is hardly ready to ignore the other's overlapping relationship and overarching tie extended over centuries.

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Note: I am not unaware of the various constraints in the use of the word Indian Sikhs. However, without the other convenience, I had to leave it unchanged.

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Spouse Selection Practices in India: A Spatial View

Nivedita Paul¹ and Bhaswati Das

Abstract: Marriages in India are part and parcel of kinship and cultural practices. Some regions, cultures, and socio-demographic factors give opportunities to choose one's spouse, whereas some allow only parents to decide. This article studies the spouse selection practices of women in India using the IHDS 2(2011-12) dataset to show the spouse selection variations and how the socio-demographic factors affect her marriage type. The majority of women in India have semi-arranged marriages, followed by family-arranged ones. Most of them meet their husband on the wedding day without prior acquaintance before marriage. Factors like age at marriage, education and urbanisation play a positive role in decision-making for spouse selection. However, the mapping results based on Karve's kinship systems show that while arranged marriage with parents' consent is the dominant form of marriage in all four regions, the relative participation of the women and their parents varies across regions. Therefore, kinship patterns explain the difference in spouse selection patterns.

Keywords: Women, Kinship, Relative involvement, Spouse selection, India

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Introduction

Marriage or wedlock is a social institution that binds two individuals in a legal and social contract to stay together and have children. Arranged marriages, where parents find grooms/brides for their children, remain the dominant form of marriage in India. However, adults are still finding new ways to negotiate with the general cultural expectations more persuasively by participating in the spouse selection process and with their family members.

Marriage is one of life's most important decisions, and having a say in marriage and choosing a spouse for marriage is important. Hence, women who choose their partner or have more say, even in arranged marriages, enter into the marriage on more or less equal ground to their male counterparts. We may expect that such women also have better reproductive rights, fewer/no domestic violence, higher proficiency in household resource allocation, better communication possibilities with their husbands and relatively healthy married life [and many other such possibilities and expectations inherent in the decision of how, when and whom to marry] (Banerjee, 1999, 2006; Rapp et al., 2012).

Marriage and marital practices intertwine kinship studies in India (Karve, 1953; Trautmann, 1981). In India, marriage practices and customs differ because of significant cross-regional diversities in social relations. Social relations have evolved due to causal relationships between space and culture. The two binaries are so intricately linked that geography becomes one explanation for why spouse selection is an incidence of various factors like caste, age, gender, predefined social relations, kinship patterns and cultural practices.

The present article deals with the spouse selection patterns of women in India, the factors affecting such spouse selection patterns and the spatial and regional variations in these patterns. Since spouse selection results from many socio-demographic factors, previous literature emphasised

¹ Corresponding Author

kinship and cultural practices to delineate the amount of say in spouse selection. However, with modernisation and other developments, women increasingly participate in spouse selection. Therefore, the article explores how some factors affect women's participation in spouse selection. The study also tries to show the spatial and regional patterns in spouse selection that can be explained in the context of kinship patterns (Karve,1953).

The Rationale for the study

Most previous studies on marriage have been based on age at the wedding. Therefore, studying decision-making regarding spouse selection is essential because the age at marriage is still low in India, and women find it challenging to build consent and maturity for marriage at such a young age. Marriage-related decision-making mainly concerns the exercise of agency or the amount of say a woman has in choosing her partner for marriage. The agency is a dimension of power that allows an individual to make sure strategic choices through bargaining, negotiation, deception, manipulation, subversion or resistance. This means, for example, when parents choose spouses for their daughters in South Asia, it is not an exhibition of power or agency but adherence to an established norm or rule that has been continuing in the society for years (Kabeer,1999). On the contrary, if daughters exercise a say in finding a spouse for themselves, they seem to exercise agency as they are making a life choice for themselves that may be against the norm of society. Kishor (1997) has defined the intention of having a say in choosing or finalising a marriage partner as control over key aspects of their life (or empowerment) since all do not have equal resources to exercise choice. In the post-colonial setting, a choice to go for arranged marriage is not simply following the dictates of patriarchal norms; but finding ways to negotiate with prevalent norms.

The customs prevalent regarding marriage favour kinds of marriage in which a girl is decorated and given away by her father to a man chosen by him. This theory of marriage, discussed in the *Dharmasutras* (Sanskrit texts on proper conduct), gave little or no opportunity for the girl to have a say in choosing her partner. Even now, the extent of choice is guided more by past social conventions and the amount of dowry being paid by her, which has experienced insignificant changes over the years (Kapadia, 1955). In countries like Nepal with a history of arranged marriage, those with better education participate in spouse choice and have a better marital quality (Allendorf and Ghimire, 2013). A study by Jeejebhoy(2000) found that though the age at marriage has little or inconsistent effects on women's autonomy in Uttar Pradesh, it leads to a decrease in marital violence and threat, better use of contraceptives and family planning measures(Jeejebhoy, 2000).

Research Questions

Based on the study and analysis, the following research questions have been raised:

- What are the patterns of spouse selection in India?
- How does the spouse selection pattern vary according to kinship practices?
- What are some of the factors affecting spouse selection patterns?

Database and Methodology

The sample for the study has been taken from the India Human Development Survey (IHDS) II. IHDS is a nationally representative multi-topic survey which covers 41,554 households. Being a longitudinal survey, IHDS II re-interviewed 83% of the households covered in the round I (2004-05). For the present study, only currently married women aged 15-49 in their first marriage are taken as part of the sample. Marriages that took place before 1970 have been excluded to remove truncation errors. The total sample that has been taken is 32,912 women.

In the survey, women were asked who chose their husbands. The responses have been recorded in four categories: (a) The respondent herself (b)The respondent and the

parents/relatives together(c)The parents and other relatives alone (d) Others, which includes other members of the family, chose the spouse or played a role in choosing the spouse.

For categories c and d above, the next question that followed was if the respondent had any say in choosing the spouse, to which the response was recorded as either 'yes' or 'no'. Hence, three marriage categories have been carved out of it.

1. Self-arranged marriage, i.e., category 'a'
2. Semi-arranged marriages comprise category 'b' and those whose response is 'yes' for 'c' and 'd'
3. Family-arranged marriage comprises those who said 'no' to the category 'c' and 'd'.

For the length/duration of acquaintances before the marriage, the question was asked about how long they knew their husband before the marriage. The response consisted of five categories- on wedding/gauna day=1, one month before marriage=2, more than a month but less than a year=3, more than one year and since childhood coded together as 4. For convenience, the last two categories have been combined into one category, i.e., 'more than one year'.

The predictor variables for spouse selection are:

1. Current age: Women are divided into three categories depending upon their age: "15 to 24" =1, "25 to 34" =2 and "35 and above" =3.
2. Age at Marriage: The age at marriage is usually taken from the variable that reports her age when she married. It is then divided into three categories: "up to 18" =1, "18 to 24" =2 and "25 and above" =3.
3. Female education: The education level of the female is calculated from her years of schooling. It is divided into four categories: "Illiterate" = 0 years of schooling, "Primary" =1 to 8 years of schooling, "Secondary" = 9 to 10 years of schooling and "Higher secondary and above" =11 to 16 years of schooling. The codifications are as follows:Illiterate=1, Primary=2, Secondary=3 and Higher Secondary and above=4
4. Parents' education: The mother and father's education has been dealt with separately, but the categorisation is the same as mentioned in the female education section.
5. Religion: Three groups have been carved from the religion response: "Hindu", "Muslim", and "Others". "Others" comprises women from other religions like Sikhs, Christians, Jains, Buddhists, etc.
6. Caste: The category of caste has been divided into three categories: "ST" (Scheduled Tribe), coded as 1, "SC" (Scheduled caste), coded as 2 and "Others", coded as 3. The 'Others' category comprises the Un-reserved category, Other Backward Castes and others who do not fall into any caste. This category can also be called the 'non-scheduled-non OBC population'. For women in inter-caste marriage, their caste before marriage is not given. Hence, it is assumed to be the same as the caste of the household.
7. Residence: Assuming that rural-to-urban migration has not occurred in marriage, their characteristics are preserved even if rural-urban migration has occurred. Hence assuming the current residence of the woman as her premarital residence also, it is divided into three categories: "Rural" =1, "Urban" =2 and "Metro Urban" =3.
8. Region: The states of India have been divided into four categories depending on their kinship and other cultural practices relating to marriage: North=1, Central=2,

South=3 and East=4. This regional classification follows Irawati Karve's (1953) classification of kinship regions. Although many scholars consider Karve's work old and outdated, she was the first scholar to give a 'feminist' perspective on the Indian family. However, as certain states have witnessed developmental changes since the 1950s, the classification has been modified to suit the changes.

To find the relationship between the independent variables and spouse selection, multinomial regression is used instead of ordinal regression to preserve the results for both self and semi-arranged marriages. Also, the order of marriage has not been converted into an ordinal scale, as acquaintances have not been considered while categorising marriages. Finally, maps showing different spouse selection patterns have been prepared using GIS software for spatial variations.

Spouse selection patterns of women in India

Marriage patterns can be categorised as self-arranged, semi-arranged, and Family-arranged, depending on the relative say of women and their parents in choosing mates. In self-arranged marriage, a woman and her groom are the sole decision-makers in choosing the partner. "Self-arranged is a better description for love marriages". All self-arranged marriages are not based on love, as some women search for a mate through online advertisements or online marriage platforms or via some friends chipping in with the search process. Often, self-arranged marriages may transcend boundaries of caste, village, community or class (Palriwala and Kaur, 2014). However, many times self-arranged marriages occur within one's community (Donner, 2002). There is increasing evidence of self-arranged marriages in recent times in which parents allow their children to marry someone of their own choice (Allendorf and Pandian, 2016). In Semi-arranged marriages, the woman and her parents are the decision-makers in spouse selection. This is a form of arranged marriage where the parents are responsible for finding mates for their daughters and then organising the wedding ceremony. Females are asked for consent and have the right to say no if they do not like the candidate chosen by their parents. Finally, family-arranged marriages are marriages where parents only are the decision maker in spouse selection. It is organised and arranged by the parents of the woman. However, it differs from the last category because, in family-arranged marriages, girls getting married are not asked for consent. It is, therefore, sometimes interpreted as 'forced marriage'. Forced marriage can be in the form of child marriage, as underage affects the ability of both spouses to understand the consequences of getting married. Marriages are categorised into three types, and it would be interesting to study the overall pattern of marriage based on spouse selection and acquaintances before marriage.

Table 1: Classification of women respondents by spouse selection type and duration of acquaintance

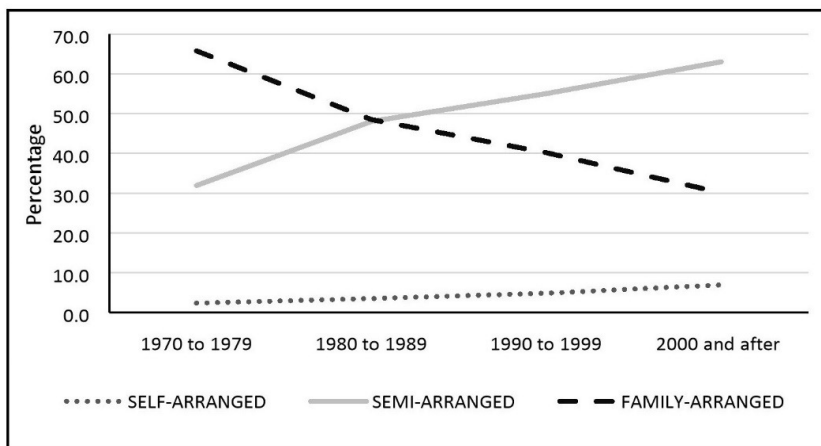
Spouse selection type	Per cent in total women	Duration of acquaintances	Per cent in total women
Self-arranged	5.1	On wedding day	67.5
Semi arranged	54.9	<1 month	14.1
Family arranged	40	> 1 month and < 1 year	7.5
		> 1 year	10.9

Table 1 gives an overall picture of women's marital arrangements in India. Though semi-arranged marriage is dominant, many women (40%) are in entirely family-arranged marriages. Self-arranged marriages are still low, at about 5 per cent. Though "unpacking agency is a complex process", absolute choice or agency in the form of love marriage or self-arranged marriage is little in occurrence, yet considering the opinions of their daughters in arranged marriage regarding the choice of partner is important (Kalpagam, 2008). Many communities in India, like the rural Kurmis of

Allahabad district in Uttar Pradesh and the Bijnor's of Rajasthan, still consider that marriage decisions should not be left to the children, and settling them for marriage is a parental duty.

Table 1 also shows the duration of acquaintances developed by the females before their marriage. About 68 per cent of the women met their husbands on the wedding day, and around 62 per cent had not developed any acquaintances (neither met nor seen photos nor talked over the phone) with their husbands before their marriage. Thus, they were married to strangers. Most persons in the North prohibit marriage between persons of the same clan and village but prefer someone of the same caste. Therefore, under these circumstances, females do not get to meet their husbands before marriage, as their husband might be someone from a distant village or state but of the same caste (Gupta, 1976). Chances of acquaintance are also low as media exposure was less at earlier times in India; hence the data may show biases based on talking over the phone.

Fig 1: Trends in spouse selection by marriage cohorts:1970s -2000s



Marital arrangements based on spouse selection patterns have changed over the years. Fig 1 shows that for women who got married in the 1970s, family-arranged marriage was the dominant form (66 per cent) of marriage, with a high percentage of semi-arranged marriage (32%) and self-arranged marriage (2%). However, for women who married in the 1980s, family-arranged marriages decreased with a consequent increase in semi-arranged marriages. This shows that women have not been given complete control over their marriage-related decisions over the years, as self-arranged marriages have been very low. Marriage practises in Tamil Nadu reveal the exact change as they have evolved from being wholly arranged in which youth have passive or no say in marriage decisions to playing an active role (Jejeebhoy et al., 2013). Semi-arranged marriage is now dominant; therefore, "arranged marriage is shifting rather than declining" (Allendorf and Pandian, 2016). Hence, it is the amount of relative control of the parents that are declining, but they continue to enjoy a significant amount of control, signifying that the change in marital decision-making in India is slow (Allendorf and Pandian, 2016; Hettige et al., 2014). Besides, romantic love is still considered to be dangerous and impractical and arranged marriage is still the norm (Desai, McCormick, & Gaeddert, 1989). Hence, young adults in India, though, are given lesser autonomy in spouse selection, but by giving boys and girls an opportunity to meet their future spouse, marriage patterns are evolving (Rao and Rao, 1982).

Factors affecting spouse selection

Although group boundaries have appeared in marriage since history, political and socio-economic factors open up space for redefinitions (Donner, 2002). While progressing this far, we have seen that various factors affect the type of marriage because the agency of women in the choice of mate

selection is determined by many factors that have been continuing in society for ages. Some have changed with rising female education, workforce participation, and other developmental factors. In addition, globalisation and the interconnectivity of the various regions, diffusion of ideas, and rise in female migration for education and employment have influenced the norms of marriage that prevailed for a long time. These changes have also changed the taste and preferences of spouses, encouraging them to choose them from a broader platform. Some of the socio-demographic factors and their effects on spouse selection have been shown in Table 2.

Table 2 below presents the results of multinomial regression for spouse selection against its independent variables or determinants. Most factors significantly affect spouse selection except for some predictor variables. The current age of the female, age at marriage, female's education, education of the woman's mother, current residence and region are the variables that are significant at p-value 0.000. Some predictor variables, like the education of the female's father, religion and caste, are partially significant. The non-significant variables are religion in the case of Muslims in self-arranged marriage, father's education for females in semi-arranged marriage and other categories in the case of semi-arranged marriage.

The log odds for the self-arranged marriage(X) as well as the semi-arranged marriage of the female(Y) shows that the older females (i.e., those born in recent years) have lesser chances (0.5 and 0.3 for self-arranged marriage and 0.7 and 0.58 times lower for an arranged marriage.

Table 2: Multinomial Regression for Factors affecting decision making regarding spouse selection

Socio-economic background characteristics	X				Y			
		B	Exp(B)	Sig		B	Exp(B)	Sig
Current age	15 to 24#				15 to 24#			
	25 to 34	-0.675	0.509	0	25 to 34	-0.225	0.799	0
	35 and above	-1.042	0.353	0	35 and above	-0.532	0.587	0
Age at marriage	Upto 18#				Upto 18#			
	18 to 24	0.49	1.632	0	18 to 24	0.523	1.687	0
	25 and above	0.996	2.707	0	25 and above	0.929	2.533	0
Female's education	Illiterate#				Illiterate#			
	Primary	0.521	1.683	0	Primary	0.456	1.578	0
	Secondary	0.888	2.431	0	Secondary	0.782	2.185	0
	Higher secondary and above	1.463	4.318	0	Higher secondary and above	1.292	3.641	0

Education of the mother	Illiterate#				Illiterate#			
	Primary	0.406	1.501	0	Primary	0.303	1.354	0
	Secondary	0.807	2.242	0	Secondary	0.372	1.451	0
	Higher secondary & above	1.141	3.129	0	Higher secondary and above	0.701	2.015	0
Education of the father	Illiterate#				Illiterate#			
	Primary	-0.318	0.727	0	Primary	-0.09	0.914	0.009
	Secondary	-0.231	0.794	0.029	Secondary	-0.053	0.949	0.276
	Higher secondary and above	-0.31	0.734	0.018	Higher secondary and above	-0.122	0.885	0.052
Religion	Hindu#				Hindu#			
	Muslim	0.085	1.088	0.362	Muslim	0.197	1.217	0
	Others	0.291	1.337	0.007	Others	0.242	1.274	0
CASTE	ST #				ST #			
	SC	-0.213	0.808	0.036	SC	0.164	1.179	0.002
	Others	-0.581	0.559	0	Others	0.044	1.045	0.384
Residence	Rural#				Rural#			
	Urban	0.349	1.417	0	Urban	0.268	1.307	0
	Metro urban	0.718	2.05	0	Metro urban	0.348	1.416	0
REGION	North#				North#			
	Central	0.998	2.714	0	Central	0.764	2.146	0
	East	3.869	47.894	0	East	1.728	5.627	0
	South	2.077	7.98	0	South	2.255	9.531	0
# The reference category								
X self-arranged marriage regarding family-arranged marriage								
Y semi-arranged marriage regarding family-arranged marriage								

with consent) of having self-arranged marriages and semi-arranged marriages than younger females. However, amongst the two, i.e., model X and Y, the log odds of Y are slightly higher than that of X,

which shows that the likelihood of semi-arranged to family-arranged marriage is more than self-arranged marriages in the recent birth cohorts. Though marriages are still arranged now, the involvement of youth in their marriage has increased (Bhakt,2015). Even among the Singaporean community, marriage in the older generation was the responsibility of the parents as the interaction between male-female was limited (Sandhu and Mani, 1993).

Age at marriage and education of the female also shows a deterministic role in the spouse selection of the female. The log odds of having a self-arranged and semi-arranged marriage increase with age at marriage by about 1.6 times as the age at marriage increases from above 18. However, the log odds of self-arranged marriage in the successive age groups of 18 and above is comparatively higher for self-arranged marriage than the other type of marriage, thereby showing that though the age at marriage increases the agency in spouse selection, this agency increases more for self-arranged marriages from the age of 18 onwards. The log odds for a greater agency in spouse selection in the form of self and semi-arranged marriage of the female is 1.68 and 1.57 times, respectively, for females with primary education and increase consecutively. However, the increase in log odds is more for self than semi-arranged marriage. College education gives higher chances to meet their potential mates and decision-making capacity than a school education. Thus, those with secondary education and above are more likely to make spouse selection decisions. Better education allows her to make her own decisions, allowing her a broader choice in partner selection (Bhopal, 2011). Schooling experiences create ideational changes among females, instilling a sense of independence from the prevailing cultural values (Ghimire et al., 2006). Women with high education and employment find a midway where they do not lament the lack of free choice but exercise some agency by at least saying 'no' to a marriage proposal brought by their parents where she feels unconvinced (Pande, 2015).

Similarly, regarding parents' education, an increase in the mother's education has a significantly positive association with the agency in spouse choice; the father's education has a negative role (as shown in Table 2). This shows that the likelihood of self- and semi-arranged marriage increases with a subsequent increase in mother's education. Women whose mothers have secondary education and above are about 2 to 3 times more likely to go for self and semi-arranged marriage than those whose mothers are illiterate. Women whose parents are educated have greater participation in their marital decisions, and such parents mainly delay their daughter's marriage so that she can complete her education first and earn her living before she gets married (Bhopal, 2011).

The effect of religion, as shown in Table 3, states that compared to the Hindus, Muslims and other religions have higher odds of having a self and semi-arranged marriage. However, the odds are more significant for other religious categories, including Christian, Jain and Sikhs, than the Hindu. Caste also significantly affects the mate selection for self-arranged and semi-arranged marriages. The table shows that the higher caste people and Scheduled castes have a lower likelihood of having self-arranged marriages but a higher likelihood of having semi-arranged marriages when compared to the scheduled tribes. Similarly, the residence significantly affects spouse selection because there is a greater likelihood of self and semi-arranged marriage in urban and metro-urban areas than in rural areas. Urban areas are 1.4 and 1.3 times more likely to have self and semi-arranged marriages, respectively and 2 and 1.4 times more likely in metro urban areas.

This study adds to the previous research that the northern region, compared to the southern region, provides lesser agency to females in spouse selection. As shown by the table, there is a higher likelihood of self-arranged and semi-arranged marriage in the Central, East and South region than in the Northern region. For example, the Eastern region is 47.8 and 5.6 times more likely to have self-arranged marriage and semi-arranged marriage (than family-arranged marriage) than the Northern region. Similarly, the Southern Region is 7.98 and 9.53 times more likely to have self-arranged and

semi-arranged marriages, respectively. The same is true for the central region, but the likelihood is not as high as in the eastern and southern regions.

Spatial and Regional variations in spouse selection patterns

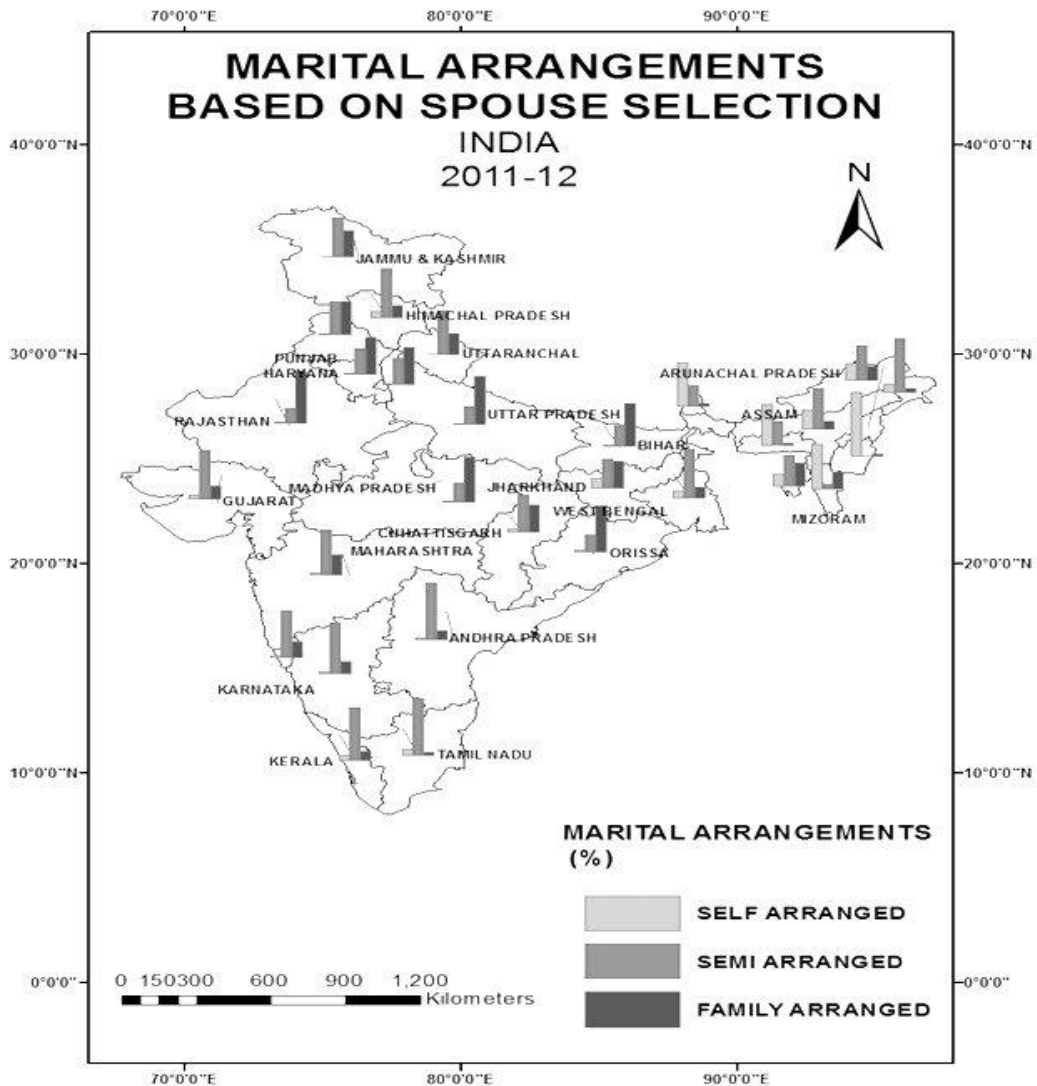
As marital arrangements and customs vary among regions in India, marital customs can be briefly discussed according to Irawati Karve's (1953) work "Kinship Organization in India". Karve (1953) has divided India into four Kinship regions based on the interrelationship of the kinship organisation and the linguistic divisions. These marital practices can be briefly shown in Table 3 below. The three kinship regions are north, south, central, and the fourth region, i.e., the eastern region, she states, is not concrete (Uberoi, 1993). The Northern Zone comprises Punjab (West Punjab is now part of West Pakistan), Kashmir, Delhi, Uttar Pradesh, and parts of Madhya Pradesh, Bihar, Bengal and Assam. Some of the family and marital features of this zone are early marriage, gauna ceremony, marrying out of the village (village exogamy), caste endogamy, marriage with a stranger (or not able to meet before marriage), polygamy (which is allowed for males but not for females) and the purdah system (where women keep large veils to cover face before the elders of the house). Families are large and joint, and the bride's father does not eat in the house where the daughter is given after marriage. All these practices make it difficult for the girl to have her choice in marriage. The Central Zone comprises the states of Rajasthan, Madhya Pradesh, Chhattisgarh, Gujarat, Maharashtra, and Odisha. Essential features of the Central Zone are marriage with paternal or maternal cousins, and many castes are divided into exogamous clans; among some castes, hypergamy also exists. The Southern Zone comprises Karnataka, Goa, Andhra Pradesh, Tamil Nadu and Kerala. Dominantly patrilineal and patrilocal, there are instances of cross-cousin marriages, or a man marrying his elder sister's daughter (a man marrying his younger sister's daughter is taboo); widow-remarriage is practised. Hence a girl always marries someone older than herself and younger than her parents. Karve (1953) states that the Eastern Zone is less compact than the above three zones. It includes people of the northeast and east who speak Mundari and Monkhmer languages, and the marriage practices of this zone are yet to be deciphered.

Map 1 below gives a pictorial representation of the three marriage types in all the states of India. It shows that self-arranged marriage in India is highest in Northeastern India. The northeast's kinship pattern differs from the rest of India because of the higher tribal population and more significant influence from Christian missionaries. The STs of the Northeast (especially the Nagas of Manipur and Nagaland) have a comparatively higher SMAM (Singulate Mean Age at Marriage) than the STs of the rest of India. This can be attributed to the late marriage of the Nagas due to many mass migrations of the youth to metropolitan towns in search of better education and jobs. With better education and job, women marrying late also possibly marry out of their own choice (Jeermison & Sahoo, 2019). On the other hand, Jharkhand shows a comparatively higher percentage of self-arranged marriages because of the higher tribal population and their different marriage practices. Women of tribal communities are supposed to enjoy more decision-making power, and some enjoy property rights (Xaxa, 2004).

In North India, most states have family-arranged marriages as the dominant form of marriage except Jammu and Kashmir, Himachal Pradesh and Uttarakhand. There is a higher percentage of semi-arranged marriages in Himachal Pradesh and Uttarakhand than in the rest of North India because, in these two states (especially in Ladakh and Himachal Pradesh), a particular form of polyandry called Himalayan Polyandry is being practised. Besides, Himachal Pradesh and Uttarakhand states are the Pahari part of Northern India, where women have much more freedom than women elsewhere in Northern India (Berreman, 1962), and norms of village exogamy is not present in most of the villages here in the Pahari area of North India. However, some tribes of Himachal Pradesh and Uttarakhand, like Kinnauras and Bhots, still practice polyandry, although most are now gradually shifting towards monogamy (Gautam and Kshatriya, 2011). J&K behaves so because it is

Muslim-dominated, and Muslims practice kin marriages, therefore higher semi-arranged marriages in Jammu & Kashmir. On the other hand, the states of Uttar Pradesh, Madhya Pradesh, Rajasthan, Bihar and Odisha have the highest percentage of family-arranged marriages as they fall within the belt of North Indian Kinship, where women have a lower autonomy, and poverty forces their parents to marry their daughter early and without their consent. Haryana also has a higher percentage of family-arranged marriages as couples in Haryana who violate the norms of caste endogamy, or rules of gotra or village exogamy, may have to succumb to violence from the family members as well as caste panchayats (Grover, 2009).

Map 1: Spatial Variation in Spouse Selection Pattern of Women in India, 2011-12



Source: Prepared by the author using IHDS II data

Semi-arranged marriages are comparatively higher in the southern states of Andhra Pradesh, Karnataka, and Tamil Nadu due to the greater autonomy of females in the South than in the North. Besides, kin marriages in some Southern states allow women to [get to] know the man getting married before marriage. In addition, other development factors like female literacy positively changes female spouse selection decision-making. The percentage of Semi-Arranged marriages is also high in West Bengal because of the rise of the modern city of Kolkata, the surrounding marketplace culture, the new print culture and the rising middle class that responds to love marriages in stable terms (Donner, 2002; Majumdar, 2009). All these changes are a result of the British capitalism that was mainly rooted in West Bengal, which transformed the traditional social practices related to marriage giving a more significant say to females in spouse selection while still adhering to the arranged marriage culture as only those love marriages that are inter-community and inter-caste are said to cause conflicts in the family.

Certain states have witnessed changes since the 1950s, so the classification has been modified to suit the changes. Since then, West Bengal, Odisha, Jharkhand, Chhattisgarh and Bihar have experienced administrative and socio-economic changes. As a result, these new states have bifurcated from their older states. Besides, modernisation has changed these states' spouse selection patterns. Hence, these are now grouped as Central states. Also, the tribal-dominated states of the Northeastern region have been clubbed into the fourth category, i.e., the eastern zone, thereby making the group compact. On the other hand, Rajasthan has been regrouped in the Northern zone because of the high prevalence of child marriages in the state (Census of India, 2011).

Table 3: Practices in the different kinship regions- A comparison

Kinship Regions	Inter-caste Marriage	Consanguineous Marriage	Patrilocal Residence	Purdah/Burkha Practise	Same Village	Amount of Dowry (in percentage)		
						Low	Medium	High
North	6.40	4.30	98.10	82.40	3.80	31.20	48.40	20.40
Central	4.90	5.40	98.10	69.70	7.60	43.60	33.50	22.90
East	8.70	0.80	94.10	65.80	28.50	65.40	18.00	16.60
South	3.80	19.90	97.00	14.20	18.50	40.90	29.10	29.90

Source: Calculated by the author using IHDS II (2011-12)

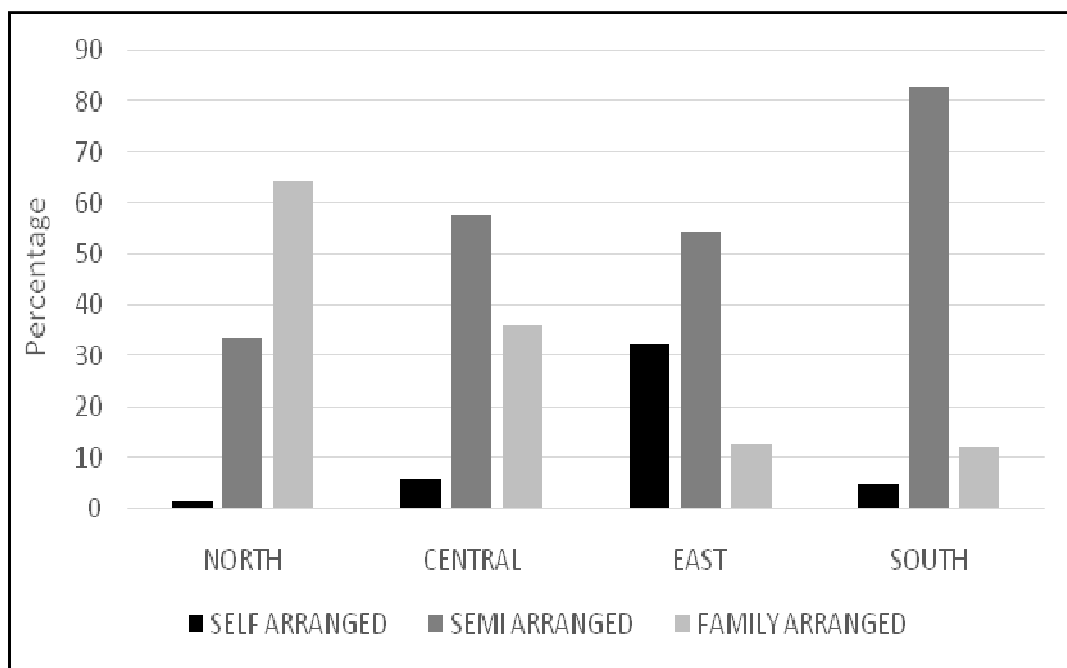
Table 3 above summarises the prevalence of different kinship practices in all four kinship regions delineated by Irawati Karve (1953) and modified as explained above in statistical form. Anthropologists find that the regional dimension of Indian kinship prevails over the other diacritical markers influencing culture and marriage practices. It states that inter-caste marriages are very low in all four regions because of the stronghold over caste (Patel, 2010). Although love marriages or the proposal to choose someone of their own may create conflicts with their parents and community; usually only those marriages that are inter-caste or inter-community create issues and are considered to deviate from the norms (Donner, 2002). Similarly, consanguineous marriage is practised more in the southern and central zones. Although more kin marriages might signify more natal family support and premarital acquaintance with the in-laws and the husband, it might also signify a more significant burden for the girl to split time between the in-laws and the natal family and also give lesser freedom to say no to a marriage proposal that comes from the relatives in case she does not want the marriage

(Rahman and Rao, 2004). Patrilocal residence means that the girl has to stay with the husband's family, with whom she is hardly acquainted, which is comparatively higher in the North and Central zones. This might imply that in areas of neolocalism or matrilocality, women have more autonomy as they are not under the control of their in-laws, which might lead to the greater exercise of rights and reduced practice of *purdah/burkha* after marriage in such regions. Areas of village exogamy are often associated with caste endogamy, where there exists a geographic 'circle of exclusion' as to where a woman should marry thereby (Raju, 2011). Therefore, the post-marital residence of women away from their natal home makes a woman an instrument by which she cannot claim any right over her parent's property nor be allowed to remain in touch with her parents. Also, dowry or gift given by the bride's family during a marriage is practised in northern and southern regions. The eastern region shows lower instances of dowry. Nevertheless, cash given as a gift is higher in the southern region compared with other regions of India (Soy & Sahoo, 2016).

Karve's work has been critiqued by many social scholars who state that there is no representation of the lower castes, particularly the 'untouchables' in the kinship practices of India (Gough, 1956). Also, the Indian kinship organisation is subtly equated with Hindu kinship. Eastern India, including earlier Bengal, Bihar and Orissa, has been chiefly neglected over the North Indian Kinship system. She has also been critiqued for trying to distinguish between the North and the South and making a line between the two regions based on marriage consolidation (in the South) with expansion (in the North), allowing more freedom to women in the South than the North.

Figure 2 shows that the northern zone mostly has family-arranged marriages as the dominant form (64.6 per cent of the total), followed by semi-arranged marriages. This indicates that women have less participation in spouse selection. Therefore, in North India, arranged marriage is still the idealised form of marriage (Grover, 2009).

Fig 2: Marriage arrangements based on spouse selection (2011-12): A regional representation



The Central Zone also shows a mixed pattern as the percentage of family arranged marriage is less than in the northern zone (but more than in the southern zone), and semi-arranged marriage is

more than in the northern zone but lesser than in the southern zone. Women in the Southern Zone have a higher percentage of semi-arranged marriages (around 80 per cent), whereas the eastern zone has a high percentage of both semis (around 53 per cent) and self-arranged marriages (around 33 per cent).

As a whole, semi-arranged marriage is high in all four regions, but the relative degree of the involvement of the woman and her parents and related cultural and customary patterns vary across the regions. As discussed above, the North India Kinship system and the marital practices here lead to more seclusion of women and lower participation in decision-making concerning her life decisions. The central zone, which has typical characteristics of both the north and south, shows a more significant percentage of semi-arranged marriages due to the greater economic participation of women in developed states like Gujarat and Maharashtra, as they have financial resources to search for potential partners via matrimonial websites. Also, some castes of Gujarat and Maharashtra speak Indo-Aryan languages but remain Dravidian in kinship (Trautmann, 1981). Hence, women will likely get married to someone already known. Similarly, Odisha, Jharkhand and Chattisgarh states have a higher percentage of tribal populations contributing significantly to the higher percentage of semi- and self-arranged marriages. As marriage opportunities are determined by factors like region, religion, caste, economic well-being and the relative number of men and women of marriageable ages; therefore women in the South find themselves in a better position to exercise agency in mate selection (Banerjee, 1999). Besides, consanguinity leads to better acquaintances with the marriage partner before the wedding. The Eastern Zone has a higher prevalence of semi-arranged and self-arranged marriages due to the higher tribal population and matrilineal and matrilocal societies. In the eastern zone, family-arranged marriages are as low as in the South, showing the better status of females.

Conclusions

The spouse selection pattern of women in India shows that about 55 per cent of women have semi-arranged marriages, and around 40 per cent have family-arranged marriages, with only a small percentage of women in self-arranged marriages. However, the strange part of the marriage process is that most women, around 68 per cent, have met their husbands on the wedding day. Furthermore, around 62 per cent have neither met their husbands before the wedding nor seen their husband's photos or conversed over the phone. This shows that marriage decisions are taken mainly by parents. As younger birth cohorts have more agency in mate selection, thus spouse selection patterns are changing with increasing autonomy given to females now. Besides, age at effective marriage and her mother's education positively give women a greater say in mate selection. Other developmental factors, like urbanisation, positively affect women's say in spouse selection. Also, women from Scheduled Tribes have more say in spouse selection than women from other caste groups.

In most regions, kinship rules perfectly explain spouse selection patterns. However, there are large variations in spouse selection patterns among states and regions, with the northern states and region falling mainly into the northern kinship belt and family-arranged marriages, in contrast to the southern region with a high percentage of semi-arranged marriages due to a high number of consanguineous marriages. The central region and states in the central zone have a mixed pattern, and among the eastern zone, the state of Manipur tops the list of self-arranged marriages. The differences in spouse selection patterns among states are accountable to the different cultural practices in the regions of India; the Northern states still favour endogamous caste marriages and village exogamous

marriages, and the Southern states prefer consanguineous marriages. Therefore, women's relative says marriage increases as we move from the north of India to the centre, then to the South and east. Many states like West Bengal, Chhattisgarh, Jharkhand, Odisha, and Rajasthan, carved after Karve's work in 1953, belong to the Central Zone of India (except Rajasthan and Odisha) now show a shift in behaviour towards more semi-arranged marriage. Thus, education, age at marriage, urbanisation and caste play a strong role in determining the type of marriage, yet kinship and marital practices that vary among different regions, continue to have a strong hold on marriage-related decisions.

Since 'consent' varies with the degree of involvement of women in the marriage and cannot be fully measured, efforts to increase women's participation in marriage have been few. Few of the initiatives taken by the government in this field relate to safeguarding the interests of those who opt for inter-caste or inter-religion marriage, such as the Special Marriage Act 1954. As inter-caste and inter-religion marriage is still taboo in India, the Special Marriage Act allows two people from different religions to marry without renouncing their religion. In some cases, the Act claims to be the only legally correct mechanism to record such a marriage, but the literature on this Act speaks of considerable problems in applying this law. The present study can also include the implications of these marital choices on her future decision-making and the impact of this decision-making upon other aspects like women's employment after marriage.

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State Formation and Urbanisation: A Study of Jharkhand State Using Nighttime Light Data (1992-2012)

Mohit Kesarwani, Bhawna Bali, Neeti Neeti¹ and Benoit Parmentier

Abstract: The study investigates the spatiotemporal pattern of urbanisation in Jharkhand upon its attainment of statehood, using 20 years (1992-2012) of annual time series data of nighttime light (NTL) and decadal Census data. The study identified the location of rapid and emerging areas of urbanisation successfully captured by the NTL data and demonstrated by LISA hotspot analysis. State formation of Jharkhand in 2000 triggered the urbanisation process resulting in the spread of urban footprint in hitherto low urbanised districts, an increase in urban settlements, mostly non-statutory towns, and the emergence of new Urban Agglomerations. Existing industrial areas, districts, and State capital headquarters have been the nucleus of urbanisation. The satellite data could not detect any statistically significant change in terms of extent in small towns that could be associated with the coarse grain size of the NTL data.

Keywords: Jharkhand, Urbanisation, Urban Agglomerations, DMSP/OLS, LISA

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Introduction

Jharkhand, Chhattisgarh, and Uttarakhand were carved as three new States of India in 2000 for regional development and sustainable resource use (Misra, 2019). This research focuses on the resource-rich State of Jharkhand, which contributed 70.0 per cent of its parent State- Bihar's revenue, before its statehood, while development expenditure was only 20.0 per cent for the region (Horo, 2013). More than a quarter of India's coal and iron ore (27.37 per cent and 25.70 per cent, respectively) and a fifth of cobalt and copper (20 per cent and 18.48 per cent, respectively) reserves are concentrated in Jharkhand (MSME, Government of India, 2015), but the State is inhabited by some of the poorest population of India. More than a quarter of the population of the State (26.21 per cent) comprises the Scheduled Tribes (STs) constituted by 32 communities, the majority of whom reside in rural areas. The proportion of STs is significant (above 25 per cent) in 13 out of 24 Districts of the State; In contrast, 111 out of 259 Blocks in 15 Districts are declared as Scheduled Areas under Article 244 of the Constitution of India, where provisions of the Fifth Schedule apply. Therefore, Jharkhand's statehood on 15th November 2000 was considered a critical step for the region's development.

This research monitors urbanisation as it is a common indicator of development related to socioeconomic growth, demographic dynamics, and land use dynamics (Shukla & Parikh, 2013). The

¹ Corresponding Author

urbanisation process is considered as an indicator of growth and progress. Monitoring and quantifying the trajectory of urban development can help understand changes and characteristics of the landscape, provide information for better environmental and resource management, and inform public policy for promoting future growth direction and development within the region.

The satellite remote sensing data has proven vital for monitoring the growth and extent of urbanisation. The Night-Time Light (NTL) products from the Defense Meteorological Satellite Program (DMSP) and Operational Linescan System (OLS) is the most frequently used product for mapping urbanisation trends at global, national and regional scale (e.g., Imhoff, Lawrence, Stutzer, & Elvidge, 1997; Lu, Zhang, Sun, & Li, 2018). The NTL data captures the city lights at night, indicating the anthropogenic activity at each pixel (Roychowdhury et al., 2011). The longer timespan of the NTL dataset (from 1992 to 2013 at an annual time scale) makes it suitable to capture the urban dynamics at a much larger time scale (Zhou, 2017), and its free usage has proved to be cost-effective. The DMSP-OLS data has been used for studies related to demography, urban and economic growth (Doll, Muller, & Elvidge, 2000; Elvidge, Baugh, Kihn, Kroehl, & Davis, 1997; Small, Pozzi, & Elvidge, 2005; Sutton, 2003). The Census data are considered the most reliable source of population data in any country, collected at an interval of 10 years. However, the 10-year data gap in the Census may not be able to capture the rapid urban expansion and change in socioeconomic dynamics. Therefore, the combined use of NTL and Census data can provide an alternate method of monitoring urbanisation trends.

The study intends to explore the impact of the attainment of statehood by Jharkhand on its urbanisation process. The primary objective of this study is to examine the spatiotemporal dynamics of the urbanisation process in Jharkhand by analysing spatial changes in the time series of NTL signals between 1992 and 2012, i.e., before and after State formation. The basic premise is that Statehood provided an impetus for urbanisation, particularly in the State capital and existing larger towns, and propelled the emergence of lower-order urban settlements. This study identifies fast-growing urban settlements and their spatial spread. An attempt is also made to identify emerging urban nodes and their likely contributory growth factors in a regional context. It, therefore, addresses the following research questions:

1. How has statehood impacted on urbanisation process in Jharkhand?
2. How does urbanisation in Jharkhand compare with its parent State of Bihar?

Study Area

The State of Jharkhand lies between 21° 55' and 25° 35' North Latitude and 83° 20' to 88° 02' East Longitudes (Figure 1). It shares boundaries with the States of Bihar, West Bengal, Odisha, Chhattisgarh, and Uttar Pradesh. Jharkhand has a total geographical area of around 79,714 Km² with a population of 32.98 million (Census of India, 2011). The State is predominantly covered by forest (~ 29 per cent). It forms a part of the mineral-rich Chota Nagpur plateau, a hub of heavy industry and related industrial townships. The largest city, Ranchi, is the State capital. Other urban centres include Dhanbad, Bokaro, Jamshedpur, Deoghar, and Hazaribagh (Census of India, 2011). The number of districts in the State increased from 18 in 2001 to 24 in 2011 following the formation of six new districts (Ramgarh, Saraikela Kharsawan, Latehar, Jamtara, Khunti, and Simdega)

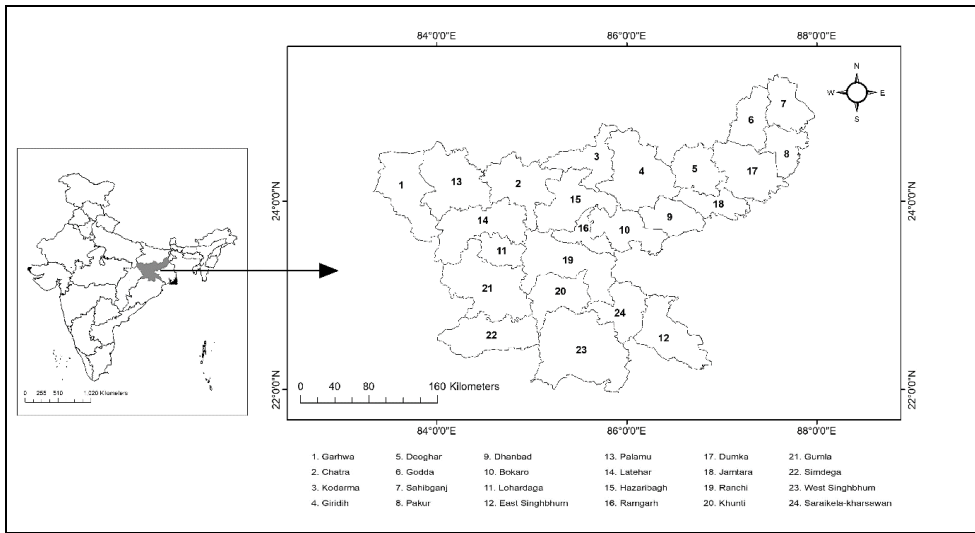


Figure 1: Study Area: Jharkhand State and its Districts

Data Sources and Methodology

The study is based on secondary and tertiary data sources. The secondary data has been collected from the Census of India decennial reports published by the Office of the Registrar General and Census Commissioner, India, New Delhi or State Directorate of Census Operations. The prominent Census publications used here included the District Census Handbook & Primary Census Abstract of different districts for three decades (1991, 2001 and 2011) and the Town Directory, Jharkhand. The data on population counts from the Census of India for the Census years of 1991, 2001, and 2011 were sourced from State Town Directory, District Census Handbook Town Release, A-1 Tables, and A-4 Tables (<https://censusindia.gov.in/>). Indicators such as the proportion of the urban population, number, and typology of urban settlements according to size, class and municipal status have been integrated as explanations for the hot spots of urbanisation in Jharkhand generated through remotely sensed data and analysed at two spatial scales, viz. district, and Urban Agglomeration (UA).

Remotely Sensed data includes two-time series datasets: Night Time Light (NTL) from the Defense Meteorological Satellite Program (DMSP)/ Operational Linescan System (OLS)) and Normalised Difference Vegetation Index (NDVI) from the Moderate Resolution Imaging Spectroradiometer (MODIS) Terra platform from 2000 to 2012 and from Advanced Very High-Resolution Radiometer (AVHRR) from 1992-1999. The study is based on an analysis of the Census of India and remotely sensed data. Table 1 provides information about the remotely sensed datasets:

Table 1: Remotely sensed dataset used for analysis

Name	Spatial Resolution (km)	Temporal Resolution	Source	Time Period
DMSP-OLS NTL	1	Annual	NOAA https://ngdc.noaa.gov/	1992-2012
MODIS NDVI (MOD13A3)	1	Monthly	LP-DAAC https://lpdaac.usgs.gov	2000-2012
NDVI (AVHRR)	~5	Monthly	LP-DAAC https://lpdaac.usgs.gov	1992-2000

(Note: AVHRR data were resampled to 1km resolution. A linear regression model was developed between the two datasets for the year 2000, as described by (Zhao et al., 2018). Based on the

established relationship between the two images, calibration of AVHRR NDVI (1992-1999) was carried out, and the annual mean NDVI time series for 1992-2012 were generated)

This study employed trend and cluster analysis to understand changes in temporal and spatial patterns of urbanisation in Jharkhand. The overall methodology involved four steps (Figure 2):

- 1) Pre-processing of NTL and NDVI and Vegetation Adjusted NTL Urban Index (VANUI) (Zhang, Schaaf, & Seto, 2013) calculation.
- 2) Spatio-temporal analysis using Mann-Kendall trend analysis (Mann, 1945; Kendall, 1938).
- 3) Image differencing and Local Indicator of Spatial Autocorrelation (LISA) (Anselin, 1995) hotspot analysis. The hotspot analysis was carried out by considering change every five years, i.e., 1992-1997, 1997-2002, 2002-2007 and 2007-2012.
- 4) Comparison and analysis of Census data to interpret changes in population and UA.

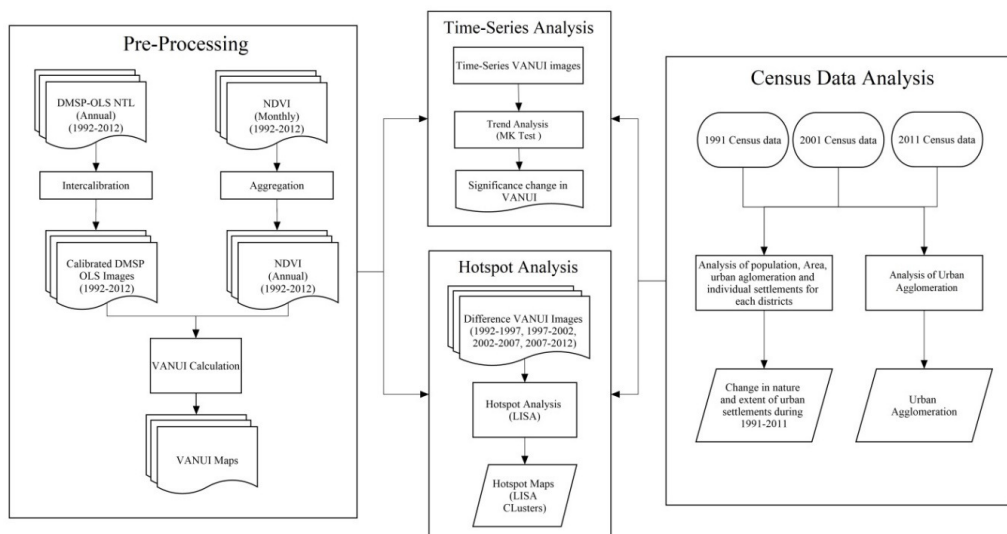


Fig. 2: Methodology for investigating spatio-temporal dynamics of urbanisation in Jharkhand

Six districts, namely Ranchi, Purbi Singhbhum, Saraikela Kharsawan, Bokaro, Dhanbad and Ramgarh, consisting of major Urban Agglomerations (UAs) that have undergone significant change in VANUI and population over the years, were further investigated for understanding spatial structure of urbanisation. This was identified using LISA hotspots and coldspots, which provided a cluster of the intensity of urbanisation. The hotspots are the area where neighbouring high values surround high values, whereas coldspots are the area where neighbouring low values surround low values. The hotspots and coldspots were calculated on four temporal differences of VANUI image with a gap of 5 years (1992-1997, 1997-2002, 2002-2007, 2007-2012). The change analysed in this study is a progressive change over time in urbanisation.

Results and Discussion

State formation and urbanisation

Jharkhand was carved out as a new State from Bihar in the year 2000 to ensure the socio-economic development of the State, given its vast mineral resources. However, its urbanisation level has remained consistently below the national average during the last three decades (1991 to 2011): 19.1 per cent, 22.24 per cent and 24.05 per cent in 1991, 2001 and 2011, respectively. Compared to the other two States – Chattisgarh and Uttarakhand, which also attained statehood along with Jharkhand, its levels of urbanisation have been marginally above Chattisgarh but below Uttarakhand (Table 2).

Table 2: Levels of Urbanisation in India, Jharkhand, Bihar, Chhattisgarh and Uttarakhand (1991-2011)

Census Year	India	Jharkhand	Bihar	Chhattisgarh	Uttarakhand
1991	25.70	-	13.10	-	-
2001	27.81	22.24	10.46	20.09	25.66
2011	31.14	24.04	11.29	23.24	30.23

This is not surprising since its parent State Bihar has remained among the least urbanised States in the country, with the proportion of the urban population remaining between 10.40 per cent and 11.27 per cent in the decades of 1991 and 2011, respectively (Census of India, 2011). Moreover, Bihar has been in chronic poverty and backwardness due to lower agricultural output, lack of industrial development and higher dependency on agriculture, contributing to out-migration primarily from rural to urban areas in north-western States (Kumar & Bhagat, 2012). These factors have severely dented its urbanisation. Likewise, Jharkhand ranked among the bottom-end States in India in its levels of urbanisation in 2011.

In fact, in the decade of its newly acquired status as an independent State, its urban population did not grow fast, registering a 32.40 per cent growth rate during 2001-11, marginally above the national average. In terms of other socio-economic indices of the urban population, Jharkhand is below the national urban average for sex ratio (910 females per one thousand males), literacy (82.26 per cent) and Scheduled Castes population (10.50 per cent) but above the national average for Scheduled Tribes population (9.79 per cent). Gaining statehood by Jharkhand provided the impetus for urbanisation, particularly of the State capital and existing large towns, and propelled the emergence of lower-order urban settlements. Prior to attaining Statehood, Jharkhand comprised 11 Districts in 1991, which were reorganised into 18 Districts in 2001 and 24 Districts in 2011. This internal administrative reorganisation of Jharkhand led to a spurt in urbanisation around the new district headquarters of Ramgarh, Saraikela Kharsawan, Simdega, Jamtara, Latehar, and Khunti. The spatiotemporal pattern of urbanisation before and after the formation of Jharkhand was analysed through the non-parametric Mann-Kendall test on two-time series of annual VANUI images (1992-2001 and 2002-2012), revealing the spread of urban footprint (Figure 3).

Between 1992 and 2001, before the separation, districts with huge mineral resources (Bokaro, Dhanbad, Purbi and Pashchimi Singhbhum) remained the focus of development and urbanisation. However, in the decade after the State's formation, i.e., between 2002 and 2012, a significant increase in urban footprint is evident in all 24 districts, but mostly in central and southeastern parts of the State (Fig. 3). Prior to the State formation, more than 40% of urbanisation was focused in three districts namely Bokaro, Dhanbad and Purbi Singhbhum Kumar (2015, p.60). After State formation, two more districts, i.e., Ranchi and Ramgarh, also picked pace and were included in the list of districts showing more than 40% of urbanisation. It is to be noted that in 2011 a majority – 170 out of 259 Sub-Districts or Tehsils mostly in the northern and western parts of Jharkhand were entirely rural, having recorded not a single urban settlement, while 45 Tehsils had only one urban settlement. The remainder 54 tehsils had more than one urban settlement. Further, districts rich in mineral reserves, such as mica and coal industries like Giridih or those with interventions like the establishment of power plants such as the Maithon power plant in Dhanbad District, Adhunik Power and Natural Resource Limited in Saraikela-Kharsawan District, and Chandrapura power plant in Bokaro District witnessed huge change since the formation of the State and contributed to its urbanisation. These developments, mostly in the southeastern part, are visible in the VANUI image of 2012 (Figure 3).

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According to NTL imagery of 2011, urbanisation in Jharkhand registered a physical expansion, accounting for 3.3 per cent of the total geographical area of the State. Against this, the Census of India data reveals only 3.0 per cent or about 2424 km². Such a difference can be attributed to the spillover effect of big urban centres in their urban periphery, captured in NTL data.

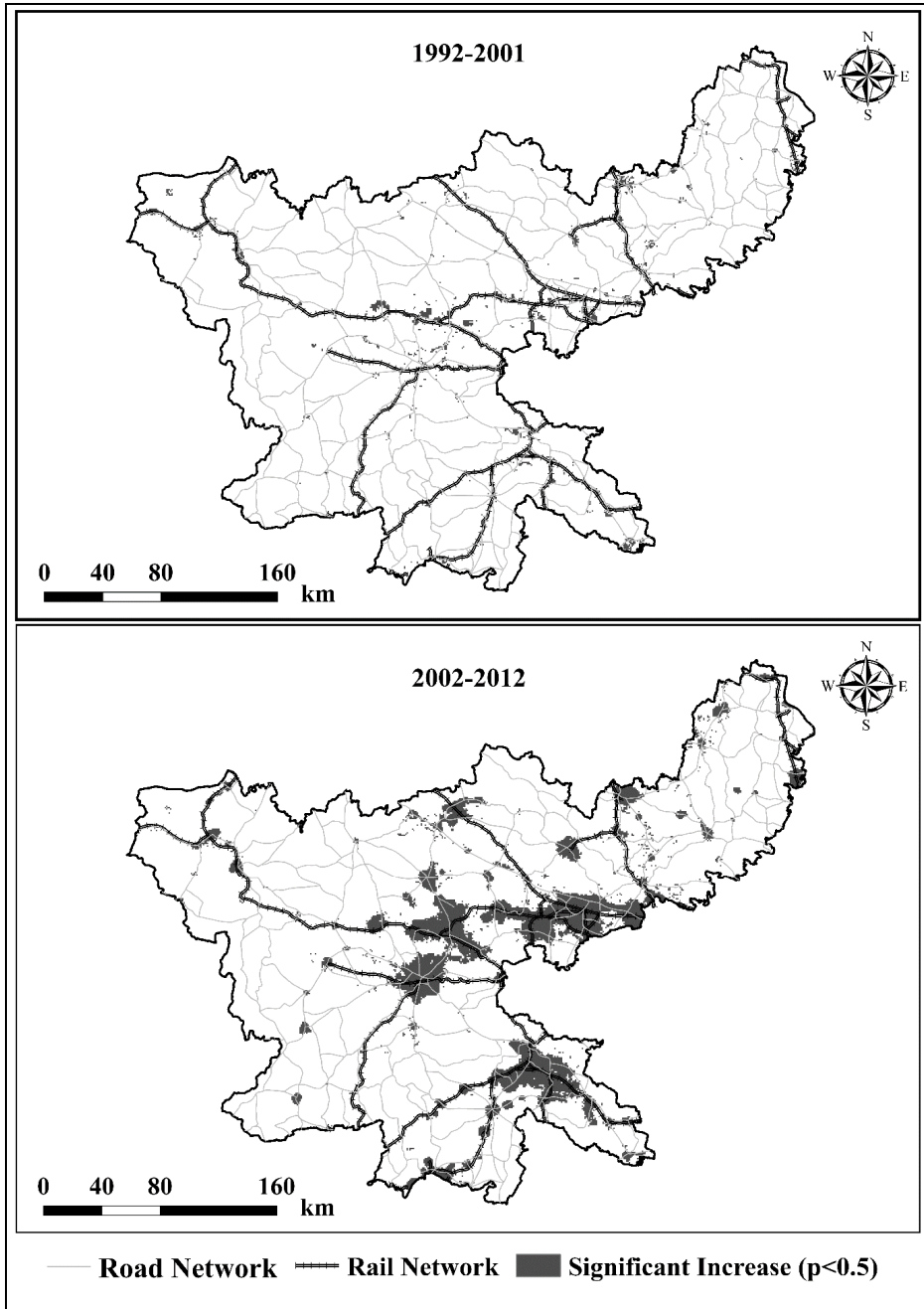


Fig. 3: Jharkhand: Intensity of the VANUI Index using the Mann-Kendall Test (1992-2001 and 2002-2012)

Urban settlements typology in Jharkhand

A total of 228 settlements were characterised as urban in Jharkhand in 2011. Of these, only 40 are statutory towns with municipal status, while the remaining 188 are Census Towns which are non-statutory urban settlements. The Jharkhand Municipal Act of 2011 recognises three-tiered municipal governance - Municipal Corporation (M. Corp.) at the top, Municipal Council (MC) in the middle and Nagar Panchayat (NP) at the bottom.¹ Among the 40 statutory towns, only three – Dhanbad (11,62,472 persons), Ranchi (10,73,427 persons) and Deoghar (2,03,123 persons) enjoyed the status of a municipal corporation (Table 3). Adityapur recorded the highest population (1,74,355 persons) among the 15 Municipal Councils (Nagar Parishad); Gumla topped among the 19 Nagar Panchayats, while Bokaro Steel City topped among the 188 non-statutory urban settlements, i.e., Census Town with a population of nearly half a million (4,14,820 persons). Jamshedpur (6,77,350 persons) - the oldest industrial township, and Mango (2,23,805 persons) are the two Notified Area Committees (NACs), while Ramgarh (88,781 persons) has the sole Cantonment Board of the State.

Table 3: Jharkhand: Municipal status of urban settlements

Municipal Status	Number of Towns
Municipal Corporation (Mahanagar)	3
Municipal Council (Nagar Parishad)	15
Nagar Panchayat	19
Notified Area Committee	2
Cantonment Board	1
Non-Statutory (Census Town)	188
Total	228

Source: Figures calculated from State Town Directory, District Census Handbook, Town Release Census of India, 2011

With most urban settlements being non-statutory Census Towns, Jharkhand's urbanisation being led by the dominance of non-statutory towns in the settlement system aligns with the general character of urbanisation in India marked as 'hidden urbanisation' during 2001-2011 (Ellis & Roberts, 2016). Census Towns, by their very definition, are urban entities; however, they lack official recognition of an independent municipal status being administered by Panchayats (rural local self-governance) and, therefore, are not mandated to levy and collect taxes and generate revenue for development activities

¹ The Act mandates a municipality with a population of more than one lakh fifty thousand to be classified as a Municipal Corporation, between forty thousand and one lakh fifty thousand as a Municipal Council and between twelve thousand and above and less than forty thousand in a transitional area, namely, Nagar Panchayat.

and municipal services. In the case of Jharkhand, Census Towns occupy an overwhelmingly dominant share in the total number of urban settlements (82 per cent) and account for one-third (32.54 per cent) of the urban population in the State. They are mainly concentrated in seven districts – Dhanbad, Bokaro, Ramgarh, Hazaribagh, Saraikela, Purbi Singhbhum and Giridih.

Further, the urban hierarchy of settlements in Jharkhand is highly skewed. Class I towns have an overwhelming dominance, with 54.56 per cent of the State's urban population concentrated in them, leading to a top-heavy urban settlement hierarchy. On the other hand, 208 out of 228 small and medium-sized urban settlements account for less than a third of the urban population (Table 4).

Table 4: Jharkhand: Typology of urban settlements by size class

Size Class	2001			2011		
	No. of Towns	Total Population	% Population in Size Class	No. of Towns	Total Population	% Population in Size Class
Class I (> 1 Lakh)	7	2425879	41.89	10	4328014	54.56
Class II (50,000-99,999)	12	943657	16.29	12	882716	11.13
Class III (20,000-49,999)	30	977790	16.88	39	1282052	16.16
Class IV (10,000-19,999)	38	581417	10.04	48	674280	8.50
Class V (5,000-9,999)	95	666639	11.51	90	634552	8.00
Class VI (< 5,000)	44	196362	3.39	29	131447	1.66
Total	226	5791744	100.00	228	7933061	100.00

Source: Figures calculated from Town Directory Jharkhand, District Census Handbook, Census of India, 2001 and 2011

As is evident from Table 4, in the decade of attaining statehood (2001-11), the overwhelming dominance of cities (Class I towns) in the urban settlement hierarchy remained strong and increased from 41.89 per cent in 2001 to 54.56 per cent in 2011. Jharkhand not only recorded an increase in the number of Class I Towns from seven to ten, with the addition of Chas, Deoghar and Giridih, but it also witnessed the rise of Dhanbad and Ranchi as million-plus cities. The remaining five Class I urban settlements include Jamshedpur, Bokaro Steel City, Mango, Adityapur and Hazaribagh. Towns of all other size categories recorded a decline in their share in the total urban population of the State. This implies a growth of large urban settlements, which could be attributed to socioeconomic pull factors and migration. Further, while an overwhelming majority - 206 out of 228 urban settlements belonged to Class III to Class VI towns, their combined population share was less

than a third of the State's total urban population. However, during this period, Jharkhand added only two new settlements (Census Towns Bachra and Sansikhara in Chatra and Dhanbad districts, respectively) to its existing 226 urban settlements, bringing the total number to 228 towns in 2011. This was unlike the previous decade (1991-2001) when an addition of 128 settlements (comprising 126 Census Towns and 2 Nagar Panchayats) to the then existing 98 urban settlements was recorded, thereby leading to a total of 226 urban settlements in 2001. The emergence of a large number of Census Towns is typically on account of the reclassification of rural settlements into urban by the Census of India based on the demographic attributes of these settlements meeting the criterion laid by the Census for such a reclassification (population more than 5000 persons, the density of population above 400 persons per square kilometre and 75 per cent male workers in non-agricultural economic activities). It must, however, be mentioned that as many as 43 of the 126 Census Towns recorded a population less than the stipulated 5000 persons. These Census Towns geographically formed a part of the urban agglomeration of the main city but were not amalgamated within the city's jurisdiction. For example, 27 Census Towns formed a part of the Dhanbad Urban Agglomeration in 2001. Many such as Bhuli, Jorapokhar with populations exceeding 80,000 persons (Class II towns) could easily be independent municipalities. However, with the non-recognition of such large urban villages as statutory towns by the State, these Census Towns continue to be administered by the Panchayats. Thus, Census Towns add to the urbanisation of the State by being part of urban statistics by the Census but negate the process of municipalisation from the State. Therefore, Jharkhand's 'slow process of municipalisation' (Samanta, 2014) has been a characteristic feature of its urbanisation since 1991. During 2001-11, as many as 24 out of 27 Census Towns were merged within the jurisdiction of Dhanbad Municipal Corporation.

Urban Clusters

District level analysis

The district-level analysis of the Census data reveals an uneven but highly concentrated level of urbanisation in the State. The spatial extent of urbanisation is extremely limited, with only six districts (PurbiSinghbhum, Deoghar, Ranchi, Ramgarh, Bokaro and Dhanbad) recording between 3.04 per cent and 17.41 per cent of their geographical area under urban settlements. Such is the concentration of urban areas that these six districts together constitute nearly two-thirds of the total urban area of Jharkhand. The urban footprint in the remaining 18 districts is very small, i.e., between 1.03 per cent and 3.04 per cent of the geographical area under urban settlements in 11 districts and a miniscule proportion of less than 1 per cent in the rest seven districts. Another feature of urbanisation in Jharkhand is the highly clustered location of urban settlements around the Sub-District (Tehsil/Taluk) Headquarters. More than half the urban settlements (176 out of 228) are located within a distance zone of 10 kilometres from the Sub-District Headquarters. This spatial trend is attributable to a significant proportion of about one-third of the geographical area of the State being under forests, mining activity, areas of the Scheduled Tribes and the availability of physical and social infrastructure in the administrative headquarters.

A majority of the districts (18 out of 24) recorded below the State average (24.05 per cent) proportion of the urban population (Table 5). Among these, as many as 11 districts have less than ten per cent (between 4.90 per cent and 9.58 per cent) of their population recorded as urban. One of the characteristics of these districts is that their settlement hierarchy is constituted of small-sized towns. They also had a near absence of Class I and II towns except in Giridih and Gumla Districts, respectively. Further, these districts have widespread forest cover and a predominance of the ST population.

Table 5: Jharkhand: Levels of urbanisation in districts

Per cent urbanised	No. of Districts	Name of Districts	No. of Towns	Per cent Urban Footprint
> 50	2	Dhanbad, Purbi Singhbhum	61	5.29 - 17.41
20 – 50	4	Bokaro, Ramgarh, Ranchi, Saraikel-Kharsawan	72	2.61 - 15.15
10 – 20	7	Kodarma, Deoghar, Hazaribagh, Pashchimi Singhbhum, Sahibganj, Lohardaga, Palamu	53	1.32 - 5.32
< 10	11	Jamtara, Giridih, Khunti, Pakur, Simdega, Latehar, Dumka, Gumla, Chatra, Garhwa, Godda	42	0.50 - 1.77

Source: Figures calculated from State Town Directory, District Census Handbook, Town Release, Census of India, 2011

Note: The state average for the urban population is 24.05 per cent. An urban footprint is a per cent district area under urban settlements.

On the other hand, six districts, namely Dhanbad, PurbiSinghbhum, Bokaro, Ramgarh, Ranchi and SaraikelaKharsawan, each recorded proportion of urban population above the State average, with Dhanbad and PurbiSinghbhum being dominantly urban (58.13 per cent and 55.56 per cent respectively). Together these six districts account for an overwhelming majority (72.52 per cent) of the State's urban population residing in 133 out of 228 urban settlements in Jharkhand (Table 5). The urban footprint ranged between 2.61 per cent and 17.41 per cent of the Districts of Saraikela-Kharsawan and Dhanbad, respectively. Broadly, high levels of urbanisation are encountered in the contiguously located central and southeastern districts, whereas low levels are in the districts to the west and northeast. Further, these spatial patterns of urbanisation reveal highly concentrated regional clusters of Class I cities in the central-east and southeast parts comprising Dhanbad-Bokaro Steel City-Chas-Giridih, and Jamshedpur-Mango-Adityapur. The three Class-I cities of Ranchi, Hazaribagh, and Deoghar formed isolated patches. Class II towns formed a relatively even distribution across the State.

Urban Agglomerations

The urban development in Jharkhand is highly concentrated in a few urban centres, as evident from the 12 Urban Agglomerations (UAs) in the State (Table 6). UAs form a contiguous built-up area around an urban core comprising at least one statutory urban settlement (city/town) with or without one or more contiguous outgrowths outside the statutory limits of that city/town and one or more adjoining towns with their outgrowths. Their numbers have increased over the last three decades: from five in 1991 to eight in 2001 and 12 in 2011. The largest UA in Jharkhand is Jamshedpur in terms of population size and the number of constituent settlements. However, regarding the spatial extent, Dhanbad UA is the largest, spread over 240.66 square kilometres. This has been due to a merger of 27 towns (mostly Census Towns) in 2011 in Dhanbad Municipal Corporation.

Table 6: Jharkhand: Urban agglomerations and their composition

District	Name of UA & Area (in sq. km)	Population of UA	Core urban settlement & No. of settlements within UA	Constituent urban settlements of UA
Purbi Singhbhum	Jamshedpur 184.07	1,339,438	Jamshedpur NAC 12	Jamshedpur & Tata Nagar Railway Colony, Mango NAC, Jugsalai M, Bagbera CT, Haludhani CT, Sarjaunda CT, Gadhra CT, Chhota Gobindpur CT, Ghorabandha CT, Purihasa CT, Adityapur NP, Chota Gumahria CT
Dhanbad	Dhanbad 240.66	1,196,214	Dhanbad MC 5	Dhanbad MC, Railway Colony & 27 towns merged with Dhanbad MC, Malkera CT, Nagri Kalan CT, Baua Kalan CT, Pondarkanali CT
Ranchi	Ranchi 197.36	1,126,720	Ranchi MC 6	Ranchi MC & Doranda, Kanke CT, Arsande CT, Ara CT, Bargarwa CT, Tundiul CT
Bokaro	Bokaro Steel City 187.55	564,319	Bokaro Steel City CT 3	Bokaro Steel City CT, Chas NP, Bandhgora CT
Deoghar	Deoghar 119.70	203,123	Deoghar MC 1	Deoghar MC, Jasidih NA
Bokaro	Phusro 90.33	185,555	Phusro NPr 5	Phusro NP & Kargali Town, Bokaro CT, Kurpania CT, Bermo CT, Jaridih Bazar CT
Purbi Singhbhum	Hazaribag 27.22	153,595	Mango NAC 2	Hazaribagh NPr, Okani – II
Giridih	Giridih 16.37	143,630	Giridih NPr 5	Giridih NPr, Sirsia CT, Dandidih CT, Paratdih CT, Pertodih CT
Ramgarh	Ramgarh 53.82	132,425	Ramgarh CB 4	Ramgarh CB, Barkakana CT, Sirka CT, Marar CT
Palamau	Medininagar 23.96	120,325	Medininagar (Daltonganj) NPr 4	Medininagar M, Sundna CT, Baratola CT, Rerma CT
Dhanbad	Chirkunda 22.59	118,777	Chirkunda NPan 6	Chirkunda NPan, Kumardhubi Town, Egarkunr CT, Suiliban CT, Mera CT, Maithon CT, Dumarkunda CT
Kodarma	JhumriTilaiya 52.82	93,620	Jhumri Tilaiya NPr 2	Jhumri Tilaiya NPr, Karma CT

Source: Computed from A-4 Tables, Census of India, 2011

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(CB: Cantonment Board; CT: Census Town; M: Municipality; MC: Municipal Corporation; NPan: Nagar Panchayat; NPr: Nagar Parisad, NAC: Notified Area Committee)

Hotspot analysis of six major districts of urbanisation, namely Ranchi, Dhanbad, Bokaro, PurbiSinghbhum, SaraikelaKharsawan and Ramgarh (Figure 4), reveals that spatial pattern of urbanisation in Jharkhand, particularly that of its UAs, is characterised by the growth of several settlements, mostly Census Towns (CTs) within proximity of existing urban cores. Among the 12 UAs, seven UAs have a large city (Class I town) as their core, while the remaining five UAs are devoid of a large city as their nucleus and comprise a cluster of small-sized urban settlements.

Most of the UAs in the State include district headquarter as their core, although districts like Bokaro and Dhanbad have recorded the emergence of a second UA centred on smaller towns along with their CTs. This is reflected in Figure 4, wherein a substantially greater number of significant pixels is noted, for example, for Bokaro Steel City UA compared to Phusro UA or Dhanbad UA compared to Chirkunda UA. Additionally, contiguous urban development across two districts is characteristic of Jamshedpur UA, which has jurisdiction in Purbi Singhbhum and Saraikela-Kharsawan. Non-statutory towns have also emerged as the new nucleus of urbanisation captured in significant pixel change, thereby giving rise to isolated patches of urban development, for example, Muri Census Town in the eastern part of Ranchi District; Barughutu Census Town in the northern part of Ramgarh District.

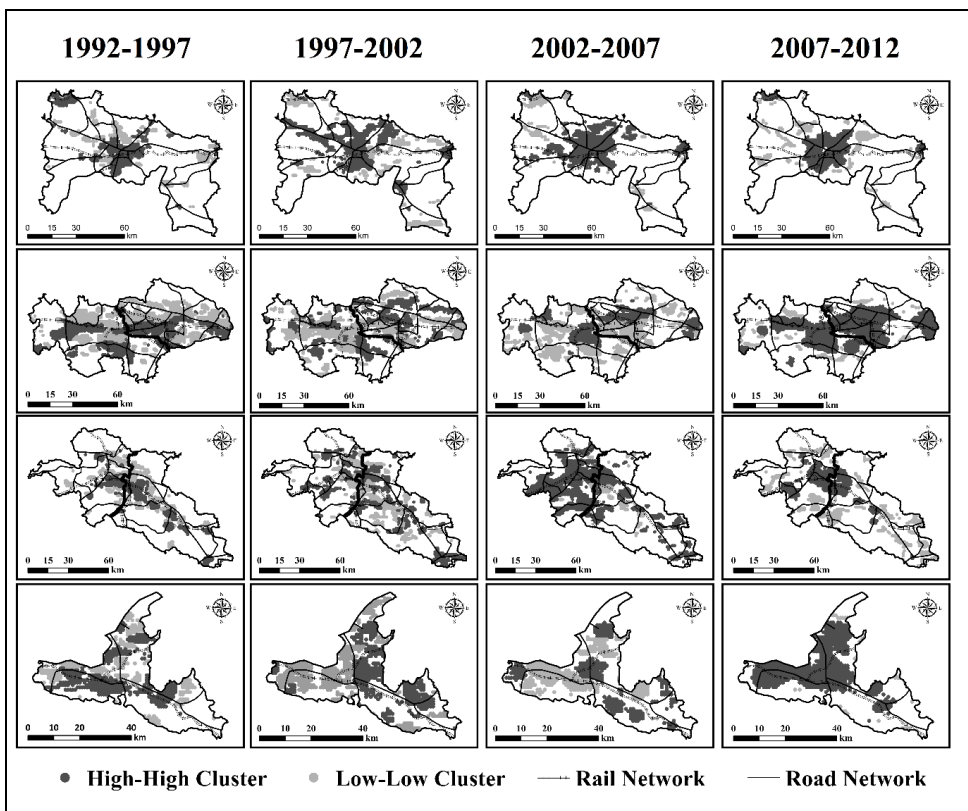


Figure 4: Jharkhand: Hotspots and coldspots of urbanisation in select districts

Note: a) Ranchi b) Dhanbad and Bokaro c) Purbi Singhbhum and Saraikela Kharsawan d) Ramgarh

Ranchi: The State Capital, Ranchi, has been a fulcrum of urban development even before the State formation. Between 1992 and 1997, the hotspots were mostly confined to the city's southern part and

around mining areas (Karanpura Dewalkhand Hesalong mine). There are also a few cold spots in the western part of the city and towards the northeastern edge of the district. The development axis expanded towards the northern and northeastern sides of Ranchi city between 1997 and 2002 and around major national highways (e.g., NH23 and NH75) between 2002 and 2007. These developments are well highlighted by the increase in the number of hotspots.

Interestingly, the period between 2007 and 2012 was one of consolidation of existing urban development and reflected in no new formation of hotspots (Figure 4a). The development that occurred just after the State formation, i.e., 2000, can also be seen from 1997-2002 and 2002-2007 hotspots. There has been vigorous development in the capital city after the State formation as the hotspots around the city have expanded in all directions. Ranchi remains the educational hub of Jharkhand with institutions like BIT Mesra, Birsa Agriculture University, Indian Institute of Coal Management, National University of Study and Research in Law etc., established over time, which have collectively contributed to its urban development. This urban expansion in different parts of Ranchi is also reflected in 74,330 urban households in 2011 (a 44% increase in the total household from 2001). The total population of UA in 1991 was 6,14,795 persons, which increased to 8,63,495 persons in 2001 and 12,57,335 persons in 2011. This is approximately a 45% increase in the population. The addition of new Census Towns to the UA indicates that development activity has also increased in the adjoining towns of the city core.

Bokaro and Dhanbad: The spatial growth of urbanisation is spread over the jurisdiction of two districts as both these districts are contiguously located. These two districts are major mining areas of the State. The LISA result (Figure 4b) of 1992-1997 indicates hotspots Chandrapura, Phusro, Bermo, Bokaro and Gumia (from east to west) in Bokaro District. The hotspot can also be seen in Bokaro Steel City in the southeastern part of the district. During 1997-2002 only a few hotspots were identified as indicative of sporadic urbanisation in the district centred on Bokaro Steel City and Gumia. After that, the Chandrapura area witnessed intensification during 2002-2007 and expansion during 2007-2012 owing to the extension of two units of the Chandrapura power plant (Figure 4b). The new units initially scheduled for commissioning in 2007 were commissioned two years later in 2009, and became operational in 2011 (Ministry of Power, Government of India, 2016). This is also visible in the map with subsequent increase in the hotspot size (For general readership, define in a footnote 'hotspot' what you mean by the term) area from 2007 to 2012. A new hotspot of development in 2007-2012 associated with Electrosteel Steels Limited near Sealjori village started production in 2012 and continued development there. Bokaro District witnessed an emergence of Phusro UA to the northwest of the already existing UA of Bokaro Steel City. The urban development was led by the transition of 19 existing rural settlements into urban settlements in the form of Census Towns during 2001-11 and a continuous belt of urbanisation in the district after 2007 (see hotspot map for 2002-07 and 2007-12).

Dhanbad District, like Bokaro District, experienced urban development from 1992-1997, but a major part of it was post-2007 (Figure 6b). The west-to-east direction of contiguous development during 1992-1997 aligns with major mining belts in both Bokaro and Dhanbad Districts and around Dhanbad city. The location of hotspots suggests some development in the district, which majorly occurred around Dhanbad city and in some nearby areas. From 2007 onwards, the entire western part of the district experienced rapid urbanisation. A clear emergence of a hotspot in 2007-2012 at the boundary of Jharkhand and West Bengal is the Maithon power plant commissioned in 2011. All the hotspots in the Dhanbad district are extensions of existing core industrial townships. The district headquarters of Dhanbad UA, which consisted of 24 CTs in 1991, gained seven CTs in 2001. In the subsequent decade, all the CTs in and around Dhanbad Municipal Corporation were merged within municipal limits, expanding the municipal area and further consolidating urban development in the district. The newly formed Chirkunda UA comprising 6 CTs in 2001 in the eastern part of the district at the Jharkhand and West Bengal border, expanded to include 41 CTs in 2011 indicating major

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development activity. Being in proximity to the then newly established Maithon power plant, where most of the development took place after 2007 when the plant was commissioned, also enabled urban development in Chirkunda and its surrounding areas.

Hotspot analysis also reveals the intensification of urbanisation in both districts post-2007. This intensification in growth is evident from the massive conversion of cold spots of the pre-2007 period into hotspots during the 2007-12 period (see Figure 4b). Both Dhanbad and Bokaro comprised one district of Dhanbad in the 1991 Census but were separated into two districts in the 2001 Census. As a result, both Dhanbad and Bokaro UAs witnessed an increase in the number of settlements comprising them, as well as population growth and spatial expansion of urban footprint.

Purbi Singhbhum and Saraikela-Kharsawan: The spatial pattern of urbanisation in the two districts are intricately linked as they share Jamshedpur UA, which is the nucleus of urban development in these districts. The industrial city of Jamshedpur, situated in the meander of river Subarnarekha, has considerably expanded as a UA to subsume Jugsalai Municipality to its southwest, along with several CTs in its vicinity. Consequently, there has been an increase in intensity in the hotspot areas since 2002 in Jamshedpur city core. While Jamshedpur city remained the core of urban development, in 2007, the northwest and northeast areas emerged as hotspots. This is attributable to leapfrog urban development comprising Mango NAC on the other side of River Subarnarekha. In addition, urban development in the district is also aligned with the national highway (Figure 4c). The urbanisation in Saraikela-Kharsawan District is an extension of Jamshedpur UA till 2002 and since then, in and around Saraikela town, which is its district headquarters and Adityapur industrial area and its surroundings. This region has many large-scale industries, including Tata growth plant and Adhunik Power and Natural Resource. Apart from the industries, some small townships are also present along these industries. The hotspot analysis also reveals that post-2001, most of the development occurred in the Saraikela-Kharsawan district compared to Purbi Singhbhum.

Ramgarh: Post its separation from Hazaribagh District and its emergence as a new district in 2007, Ramgarh experienced large-scale urbanisation centred on Ramgarh city and the mining areas in northern and western parts. The hotspot maps (Figure 4d) suggest that from 1992 to 2007 when it was part of Hazaribagh district Ramgarh, much of the urbanisation was confined to the Northern, Central and Western parts of the district in patches. During 1992-1997 the development in the district was mainly in the Northern, Central and Western parts. The Northern and Western part of the district mainly comprises the mining areas, while the Ramgarh city is in the centre. During 1997-2002 only the main city area of Ramgarh experienced urbanisation, and some of the urbanisation can also be seen in the northern part. A new hotspot can be seen in the eastern part of the district at the border, mainly comprising mining areas. Post the formation of the State, i.e., from 2002-2007, the district did not undergo much urbanisation, and it was mainly focused on Ramgarh city and the mining area present in the Northern and Western parts of the district. Acquiring district status and setting up the Jindal Steel plant in 2009 accelerated the growth of Ramgarh towards the western part of the district.

Further, Ramgarh UA grew significantly in 2011, comprising 23 CTs compared to the previous two decades when it had only three CTs. This is also reflected in a large increase of 279 per cent in the population of Ramgarh UA, i.e., from 110496 persons to 418955 persons. The hotspot map of 2007-12 captures this increase (Figure 4d).

Conclusions

The spatial patterns and directionality of urban expansion in the State of Jharkhand upon its attainment of statehood have been identified and analysed in this study through the time series of NTL from 1992-2012 and Census data. The study reveals a limited change in general urban dynamic growth prior to the formation of the State (during 1992-2002), which mostly hinged around industrial areas. After the State formation, an increased urban footprint was found across different districts,

which has become more compact and concentrated around district headquarters. However, six districts comprising Ranchi, Dhanbad, Bokaro, Purbi Singhbhum, Saraikela-Kharsawan and Ramgarh recorded major changes. UAs increased to 12 in 2011, mostly on district headquarters and CTs. However, regarding an urban settlement hierarchy, Jharkhand has remained bottom-heavy with many small towns and a dominant of non-statutory urban settlements, i.e., Census Towns. An upward movement in the higher-size class category was highly limited as three cities (Chas, Deogarh, and Giridih) attained Class I status, and Ranchi became a million-plus city. Tracking and monitoring urban expansion is crucial to managing resources better and providing amenities in fast-growing settlements. Economic development, including industrialisation, is critical in shaping urban development, particularly in a state driven by its rich mineral resources. It would be interesting to map the impact of economic liberalisation on the urbanisation of the State, which can be a theme for exploration in future studies.

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Quality of Life at the Micro-Scale: A Study of Sangrah Development Block (Himachal Pradesh)

Puran Chand and B.R. Thakur¹

Abstract: The quality of life in different places is subject to considerable debate. In the postmodern world, quality of life is viewed as a unique living experience of an individual or group at any place. Quality of life is considered a multidimensional social, environmental and perceptual concept. In the present framework, quality of life has been viewed as satisfaction, where the ideas have been operationalised at the household level. In all, 436 households (about 20% of the total) spreading across 18 villages were selected randomly for the primary survey for the quality of life domains, i.e. education, health, housing, environment cleanliness, employment, income and wealth, information and communication, governance and democracy and public participation. It attempts to understand the dynamics of quality of life in the study area in three altitudinal zones. Principal components analysis has been applied to subjective and objective variables of quality of life domains to understand the key determinants. The study concluded that villages with better ease of physical access, administrative centres, and large populations reported better quality of life in the study area.

Keywords: Quality of life, Life satisfaction, Community, Principal components analysis, Himachal Pradesh

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Introduction

The concept of quality of life emerged when the society in the West grew wealthier, but the people's life satisfaction did not witness concomitant improvement. As a result, scholars began to argue against raising the material standard of living, claiming that such increases would do little to raise wellbeing. These arguments are based on a key finding in the emerging literature on subjective wellbeing, the Easterlin paradox, which suggests no link between a society's economic development level and its members' happiness (Stevenson and Wolfers, 2008). Quality of life studies have emerged since the late 1960s as an extension of the set of measuring instruments to gauge the impact of development policies and efforts. Recognition of the multidimensional nature of the development process gave rise to a growing dissatisfaction with the narrow and truncated contribution of GDP per capita as a measuring instrument. This led to the search for a wider range of social and economic indicators reflecting a more holistic picture of how well people live (Beukes and Cloff, 1997). Quality of life studies approach the question from various perspectives and disciplines. At the centre of this growing interest is the attempt to define the concept of "Quality of Life" to study the elements that determine it and propose mechanisms that could contribute to its improvement (Lever, 2000).

The term quality of life finds appearance in various disciplines, but there is little agreement on the definition of the concept. It is used interchangeably with other concepts like wellbeing, subjective quality of life, satisfaction, happiness etc. (Cummins, 2000; Bramston, 2002). Quality of life is too broad to define as it combines many factors like place, time, technology, environment,

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Corresponding Author

culture etc. People react differently to the same condition and evaluate circumstances based on their unique experiences, values and expectations. The element of diversity for culture and value systems makes the standardisation of definitions difficult. Quality of life means different things to different people, with an idea of satisfaction or wellbeing to each individual or group at any place. (Dissert and Deller, 2000). Quality of life has been assessed at a subdomain, domain and global quality of life levels. Similarly, society can be assessed at different geographical scales ranging from individual, group, regional and national scales. The larger spatial scale of inquiry generalises our understanding of the individual quality of life (Pacione, 1982). Large spatial scales like state and nation were assessed on objective variables during the social indicators movement. This could not provide adequate information about individual or subjective quality of life. The concern of the social indicators movement continued to compare cultural units or within cultural units over time (Evans, 1994).

While there is no overwhelming consensus on actual measures of subjective life quality, there is a widespread agreement that subjective life quality is related to such aspects of personal life as aspirations, expectations, happiness, and satisfaction (Schneider, 1975). Subjective wellbeing and subjective quality of life are overlapping concepts. Subjective quality of life includes a personal evaluation of the objective conditions of life. This generally includes life satisfaction, pleasant effect and unpleasant effect. The effect implies emotions and moods associated with cognitive experiences and perceptions/judgments of the individuals (Diener & Suh, 1997). A person may report a high level of subjective wellbeing, despite environmental conditions that are bad enough to shorten life expectancy, affecting immediate future QOL significantly.

Similarly, a person's objective QOL conditions (e.g., health, material possessions) may have little to do with subjective wellbeing. For example, a person may be wealthy yet feel very dissatisfied with life, perhaps because of a comparison with others who may have more material possessions. Hence, the argument is that subjective and objective indicators are necessary conditions, but neither is sufficient to encompass life experiences (Hagerty et al., 2001). Social indicators and subjective wellbeing measures are complementary. Individuals and cultures transform objective inputs to produce what is perceived by individuals and cultures as desirable or undesirable. Subjective wellbeing measures assess peoples' reactions involved in such a transactional process. What is good for people cannot be determined without considering their views. (Monteiro, 2019).

Objective indicators are based on quantitative statistics rather than individuals' subjective perceptions of their social environment. Such indicators are relatively easily defined, and widespread agreement exists about what is being measured (Diener & Suh, 1997). Since there can be no measured reality beyond our capacity to experience the world, the so-called 'objective' measures are a product of our perceptions and, consequently, subjective (Cummins, 2000). Such indicators are generally used to assess life quality at state and national levels as it is helpful in social comparison compared to subjective indicators, which vary from person to person and culture to culture due to perception weight and are generally applied at individual or group level studies. A combination of subjective and objective variables is necessary to understand life quality.

Theoretical perspectives

There are different approaches in the literature to studying the quality of life. Kaufmann et al. (2007) have given a detailed description of approaches generally applied in quality-of-life studies. Prominent among these are the welfare approach (utility maximisation), capital approach (human and natural capital), capability approach (Sen, 1993) and migration rates (Greenwood, 1991) to measure the absolute and relative quality of life and living standards across regions and ecosystem sustainability approach etc. Apart from these approaches, important perspectives applied to study the quality of life are happiness, life satisfaction, and need and life satisfaction.

Happiness is considered an important aspect of quality of life. Campbell (1976) believed happiness was a momentary state. Shin and Johnston (1978) proposed that happiness is based on specific needs and resources in the environment and cultural settings. Kahneman (1999) proposed the objective happiness concept and argued that happiness is more than pleasurable stimuli. Peiro (2007) concluded that health and marital status are strongly related to happiness and overall life satisfaction. However, such conclusions are partially correct in the case of marital status context, and it needs further deeper cultural contexts. As in the case of India, a large share of the population spend their life as saints, staying unmarried and living a happy life. Among the need-based approaches, Maslow (1954) proposed that some needs are more basic than others; this theory proved to be the foundation for other need-based life satisfaction theories. Campbell (1976) argued that there are some threshold satisfiers of wellbeing beyond which it is hard to expect positive results. Following Maslow's need hierarchy, Sirgy (1995) proposed that the greater the satisfaction from the basic and higher-order needs greater the life satisfaction achieved. Drewnowski (1980) views the quality of life as a function of 'basic need' and 'environment'. Arndt (1981) proposed physical, social, and self-actualisation needs as imperative for life satisfaction. Allardt (1993) proposed 'having', 'loving' and 'being' needs of life to achieve life satisfaction. Regarding need satisfaction, Sirgy et al. (2006) mentioned that the type of need in any society depends on the prevalent development type. Increasing development shifts focus from basic needs to growth needs and, thus, the overall picture of the quality of life.

Conceptual framework

This study addresses the issue of good life and good place in the rural settings. This has been achieved by studying the subjective and objective dimensions at the household and village levels. To the question, what is a good life? Some directions of the moral psychology of gratitude, religion and numerous other branches of knowledge offer a criterion for a good life. In the works of Plato, Aristotle, and St. Augustine, the text of the Old Testament, the Upanishads or the Quran, and the relevant literature, Peterson and Seligman identified over 200 virtues. In almost all the works, regardless of the time of origin and civilisation environment, they found six basic human virtues: wisdom, courage, love, justice, moderation and spirituality. Peterson and Seligman consider these six virtues of being basic human qualities which together form the concept of good character and are almost supported by all religious and philosophical schools of thought (Murgas & Klobucnik, 2016). Today's postmodern world can no longer completely accept the idea of grand theories of the good life as preached by religion and suggested by various disciplines like psychology or every branch of knowledge that seeks to enhance the quality of life of individuals and communities. Those values are undoubtedly part of a good life anywhere in the world. However, there is something more than that which changes with place and time, i.e. culture (way of life), which influences human needs and desires and eventually the standards of a good life. Life quality is a product of this system of culture realised by the individual and communities who live in the system anywhere.

To assess the good life in the study area, ten domains have been considered as key areas of quality of life. These domains are environment cleanliness, housing, education, health, personal wellbeing, democratic and public participation, information and communication, employment, income & wealth and governance. An attempt has been made to explore the relationship between the socio-economic conditions of the rural folk concerning their place or location-based conditions and experiences thereof. In the present study, direct and proxy measures of quality of life dimensions like economic wellbeing, education level (i.e. knowledge and skill), health (accessibility and quality of services), social organisation (i.e. community cohesion and participation), political participation (democratic awareness) have been used to bring out some inferences about the determinants of quality of life. Household-level analysis has been undertaken to reduce the generalisation of quality of life. The quality of good life has been viewed as satisfaction concerning these life domains. As the quality of life differs from individual to individual and region to region, a micro-level analysis of life across three altitudinal zones has been done to see how satisfaction varies across the quality of life

domains within the study area. This is based on the bottom-up approach in which individual satisfaction leads to community satisfaction.

To the question of what makes it a good place to live? Popular publications such as *Places Rated Almanac* feed the community's desire for self-worth. To be successful communities, they must accurately assess the internal resources and translate these resources' qualities into value (Sirgy et al., 2001). Place studies are one of the facets of quality-of-life research. Our image of place and attachment to place influence our evaluation of places, our behaviour towards them and ultimately, the quality of life we find there. Many geographers argue from the existential point of view that places are unique, have different meanings to different people, and are experienced in their own way. The most extensive review of these humanistic approaches to place is found in *Places and Placelessness*, where Relph describes the essence, sense and identity of places and the role of phenomenology in studying places (Cutter, 1985). Geographers and others working on a range of issues of quality of life and their effects on individuals and groups prominently feature overcrowding, natural hazards and ambient environmental conditions, stressful events in everyday life with ease of access and orientation, security and privacy, residential satisfaction and communities (McCann, 2004).

Quality of life research helps differentiate and evaluate the places to explain the social demographic changes at any level. The study of quality of life is also important when two places are of equal importance from the economic perspective. This is also important from the government policy point of view to highlight the distribution of resources allocated and spatial variation in the quality of life. The present study's quality of life index has been composed based on subjective and objective variables. This will help us know the key area of life mostly viewed by residents as an essential part of life and the performance of areas on quality of life issues. In addition, the spatial distribution of factor score has been used to unmask the household-level variation of quality of life. This will help understand people in mind and people on the ground in the study area. Another purpose of the index is to make policymakers understand the importance of both dimensions of life to enhance people's quality of life. This is about understanding the essence and experiences of people's life.

Objectives

1. To identify the determinants of quality of life in the study area.
2. To compare and examine the quality of life across altitudinal zones in the study area.

Study Area

Sangrah block lies in the Sirmaur district of Himachal Pradesh state in India. Geographically, the study area is located between 30°22'30" and 31°01'20" north latitudes and 77°01'12" to 77°49'40" east longitudes (Fig. 1). Sirmaur district is divided into two parts by the Giri River, which runs parallel to the Himalayan mountain range. The northern part is known as the Trans-Giri region (beyond Giri) and the southern as the Cis-Giri (inside Giri). Trans-Giri region is inaccessible and mountainous as compared to the southern Cis-Giri part, which is well connected to other parts of the state. Its northern boundary is marked by Churdhar Mountains and southern by the Giri River. It is bounded by Tons and Yamuna rivers in the east. Sangrah community development (CD) block is located in the central part of the Trans-Giri region. The study area occupies a total area of 486.4 km², and it had a total population of 70,410 persons in 2011, the whole of which is rural. There were 11,567 households in the block living in 121 inhabited villages. The village is the lowest administrative unit in India. The area supported a population density of 193 persons per km². Wide differences in income, housing conditions and a combination of modern and traditional settlements characterise the block. Based on the level of living indicators, 60% of the total households reside in RCC buildings, 53% of the total literates are educated beyond matriculation, 80% have access to basic sanitation and merely 17% of the total own a car.

Database and Methodology

The present study is based on primary data. The data have been collected through interview schedules applied at the household level. For sampling at the household level, the study area has been divided into three altitude zones. After superimposing the village boundary upon the relief map, the required villages in each characteristic altitude zone have been selected for sampling purposes. The low altitude zone, less than 1200 meters above mean sea level (AMSL), has 35 villages. The medium and high altitude zones are inhabited by 53 and 34 revenue villages, respectively (Fig. 1). Based on the maximum and minimum population size, female literacy rate, and female work participation rate of each village as per the 2011 Census, 18 villages (6 villages from each altitude zone) comprising 15 per cent of total villages have been selected for sampling at the household level. Four hundred thirty-six sample households (about 20 per cent of total households) spreading across 18 villages were randomly selected for the primary survey. From each village, seventy per cent of households have been surveyed from the general castes and thirty per cent from the scheduled castes. In the total share of respondents, 51.6 per cent (225) have been males and 48.4 per cent (211) have been females. The 18-40 years age group comprised 40 per cent, the 41-59 age group 44 per cent, and 60 years and above aged accounted for 16 per cent of total respondents. The face-to-face interviews lasting about an hour have been conducted, and responses have been recorded. The field survey has been undertaken from 1 June 2018 to 28 August 2018.

This study used two variables, one at the household and the second at the village level. In all, 41 variables (with a correlation of 0.3 visually observed in the correlation matrix of all variables) relating to ten domains of quality of life at the household level have been taken for the study (Table 1). Each objective variable has been evaluated with a subjective aspect on the Likert scale of classification. This included subjective responses from the community to personal level satisfaction in different aspects of quality of life. The variables have been transformed into scores ranging from 1-5. Score 1 has been given to the lowest contributor and 5 to the highest contributor in the overall quality of life in the study area. In order to calculate the aggregate household economic activity score, the households have been classified into five categories based on the occupation practised at the time of the survey. While computing the economic activity score of each household, a 0.5 score has been assigned to an individual engaged in primary, 1 to secondary, 1.5 to tertiary, 2 to quaternary and 2.5 to quinary occupations. In addition, each household's score of all household workers has been computed.

The principal components analysis (PCA) method used by many social scientists in multivariate statistical analysis has been employed to identify the key determinants of quality of life. The principal components method of factor analysis has been used to reduce and adequately summarise the information contained in the original variables into smaller groups of factors with minimum loss of information. The suitability of the principal components analysis (PCA) technique has been assessed by standardisation of variables, visual analysis of correlation matrix for all the variables and Kaiser-Meyer-Olkin (KMO) - a measure of data adequacy. The KMO measure was 0.734, which is above the criteria of 0.5. Based on eigenvalues 1.00 and above, scree plot, visual analysis of correlation matrix for all variables, and total variance explained >70 per cent, only 28 variables (with correlation 0.5 in the correlation matrix of all variables) have been extracted (Table 2). Chronbach alpha has been used as the measure of data reliability, and the value for each domain is given separately in Table 1.

In order to formulate a social policy and adopt appropriate interventions at the village level, a quality of life index based on subjective and objective variables has been constructed. Index construction also helps rank villages according to quality of life variables. The variables included for the index construction have been extracted through PCA (Table 3). Following Greyling (2013) and Saitluanga (2015), the method developed by Nicoletti et al. (2000) has been applied as a weighing

technique. The method used PCA to weigh the index according to the explained variance in the data. The benefit is that a higher proportion of variance in the data set is explained.

While computing this index, firstly, the raw data (quality of life total score at the village level) are normalised using the following formula:

$$N_{ij} = 1 - \frac{[Best\ X_{ij} - Observed\ X_{ij}]}{R}$$

Where R= Best X_{ij}-Worst X_{ij}, i=ith observation and j=jth village.

PCA has been used to calculate the factor loadings and eigenvalue of the indicators. In the next step, weights were calculated. The weight of each variable is derived by squaring the variable's loading divided by the factor's eigenvalue. The weights have been calculated for each indicator, and the index was determined using the following formula:

$$I = \sum X_i (\sum |L_{ij}| \cdot E_j) / \sum (\sum |L_{ij}| \cdot E_j)$$

Where I is the index, X_i is the ith indicator, L_{ij} is the factor loading of the ith variable on the jth factor, and E_j is the eigenvalue of the jth factor.

The weight score is obtained by multiplying the variable weight and weight of the respective factor. Then, the final weight is obtained and rescaled again to sum up to one to preserve comparability. Finally, each sample village has been ranked and mapped according to the final weights.

Table 1: Sangrah Block: Domains and indicators of quality of life (household level)

Domains	Indicators	Chronbach Coefficient of Reliability
Environment Cleanliness	Water quality (based on international wealth index) Provision of waste water disposal facility in the house Satisfaction with overall quality of physical environment Satisfaction with waste water disposal facility in the house	0.629
Housing	Main cooking fuel Room density (persons per room) House type (building material) Satisfaction with the quality of housing material with respect to climate conditions Satisfaction with the open space available in residential complex Provision of toilet, bathroom etc.	0.690
Education	Interviewee educational level Head of the household educational level Satisfaction with overall quality of education	0.733
Health	Satisfaction with the sleep Satisfaction with overall health Number of household member ill since more than five years Overall satisfaction with access to the health services	0.702

Domains	Indicators	Chronbach Coefficient of Reliability
Personal Wellbeing	Overall satisfaction with life Trust behaviour in the neighbourhood Satisfaction with overall achievements in life Satisfaction with feeling part of the community	0.654
Democratic and Public Participation	Frequency of participation in the panchayat meetings Importance of participation in the panchayat meetings Frequency of participation in the community cleanliness drive	0.659
Information and Communication	Frequency of listening the news Frequency of reading newspaper Importance of reading/listening news daily	0.702
Employment	Satisfaction with animal husbandry practice Number of females of the household engaged in economic gainful activity Household economic activity score Satisfaction with overall employment opportunities available Satisfaction with overall economic conditions	0.724
Income and Wealth	Overall satisfaction with consumer durables available Satisfaction with standard of living Total landholding ownership (ha) Average annual income of the household Average monthly expenditure of the household	0.705
Governance	Satisfaction with the work of panchayat leaders on right issues Satisfaction with work get done without any political or administrative closeness at the panchayat level Satisfaction with work get done without any political or administrative closeness at the block level Satisfaction with work get done without any political or administrative closeness at the district level	0.935

Source: Compiled by Authors

Results and Discussion

Principal components analysis results

The present study used 28 variables of quality of life. The scree plot shows that nine components have an eigenvalue greater than one and can be retained. The total variance explained from the cumulative percentage is 71.66% extracted from the nine components of the total variables. The first component explained 18.36%, while the second, third, fourth and fifth explained 11.52%, 10.12%, 7.63% and 6.05% of the total variance of the factor solutions. The factor analysis also indicates a high correlation ranging between 0.533 to 0.972 among the extracted variables. This indicates that each variable taken for the analysis was significantly correlated with all other variables.

Table 2: Sangrah Block: Factor loading matrix for quality of life at household level

Variables	Factors								
	1	2	3	4	5	6	7	8	9
Satisfaction with work get done without any political or administrative closeness at the block level	0.972								
Satisfaction with work get done without any political or administrative closeness at the Panchayat level	0.969								
Satisfaction with work get done without any political or administrative closeness at the district Level	0.951								
Satisfaction with the work of panchayat leaders on right issues	0.747								
Satisfaction with overall health		0.957							
Overall satisfaction with access to the health services		0.955							
Satisfaction with sleep		0.769							
Household economic activity score			0.832						
Female in economic gainful activity			0.678						
Average annual income of the household			0.672						
Average monthly expenditure of the household			0.637						
Satisfaction with the waste water disposal facility in the house				0.771					
Satisfaction with the open space available in residential complex				0.699					
Frequency of reading newspaper				0.55					
Main cooking fuel				0.541					
Satisfaction with animal husbandry practice				0.533					
Overall satisfaction with life					0.886				

Satisfaction with overall achievements in life					0.812				
Satisfaction with overall quality of physical environment					0.619				
Interviewee educational level						0.896			
Satisfaction with overall quality of education						0.882			
Head of the household educational level						0.548			
Frequency of participation in the panchayat meetings							0.925		
Importance of participation in the panchayat meetings							0.916		
Total landholding ownership (ha)								0.846	
Satisfaction with overall consumer durables available								0.734	
Satisfaction with feeling part of the community									0.887
Trust behaviour in the neighbourhood					0.501				0.667
Eigen value	5.143	3.226	2.834	2.132	1.696	1.463	1.298	1.211	1.063
% of Variance explained	18.367	11.52	10.123	7.613	6.056	5.226	4.634	4.325	3.797
Total variance explained	71.66								

Source: Compiled by Authors

Factor 1: Governance

Factor 2: Satisfaction with health

Factor 3: Occupation, income and expenditure

Factor 4: Cleanliness, news and standard of living

Factor 5: Satisfaction with life.

Factor 6: Education

Factor 7: Participation in local governance meetings

Factor 8: Landholding and consumer durables

Factor 9: Trust in the neighbourhood

Spatial pattern of governance factor score

Governance has emerged as a key determinant responsible for about 18% of variations in the quality of life in the study area. The spatial unevenness of the first component of quality of life, named governance, has been categorised into five classes based on the factor scores (Fig.1). The governance aspect has been evaluated through a five-point perception scale, i.e. very satisfied, satisfied, moderately satisfied, dissatisfied and very dissatisfied for four variables, i.e. i) Panchayat leaders working on right issues, ii) people get their work done without any political/administrative closeness at the panchayat level, iii) people get their work done without any political/ administrative closeness

High altitude zone

The high altitude zone is characterised by the highest share of households (14.9%) falling in the very high category of governance. The particular concentrations of such households (24.7%) have been reported in the Nohra village of the area. The share of the moderate category of households is 7% of the total in this zone. The very low category has a share of 15.4% of total households in this zone. The highest share in this zone's high quality of life is attributed to the good governance experience of people in the public offices at the Panchayat, block and district levels. Besides, the inhabitants feel that Panchayat leaders are working on the issues required for local area development.

Middle altitude zone

This zone is characterised by a higher share of total households falling in the low and very low categories of governance. This zone observed 41.9% of households falling in the low category factor score and 24.8% of the same falling in the very low category. A higher share of the low category has been reported in Bhawai and Kotion villages. Bhawai is the most populated village in this zone. Bhawai reported 18.3% of households in very low and 45% in low categories.

On the other hand, the share of a very high governance score was observed for 13.7% of households. Shamra village reported 15% of total households in the very high category, while Bhawai reported 14% in the same bracket. The higher share of households in this zone's low and very low categories of factor score may be attributed to the common practice of malfunctioning at the public offices and improper working of the Panchayat leaders. It shows that penetration of ill governance at the Gram Panchayat level hampers the social wellbeing in the mid-altitude zone. It is indeed a matter of grave concern to the general public, dependent on the functioning of governance bodies for their wellbeing.

Low altitude zone

This zone is characterised by a very low share of households (4.6%) falling in the very high factor score category. The households found in a very low category are 8.39%. This zone's low factor score category accounted for the highest share of 67% of households in the study area. The households with very high concentrations of moderate governance levels have been reported from Sangrah, Jamu and Kuftu. Sangrah is the most populated village in the zone. It recorded 46.47% of the total households in the moderate category. The high share of households in the moderate category indicates this village's moderate level of governance experience. In brief, this zone portrays dissatisfaction with the quality of governance.

The high altitude zone, the most inhabited zone, accounted for 14.9% of households in the very high category. The mid-altitude zone shared 13.7 % of the sample households in the same category. The low altitude zone accounts for 4.6 % of the same households in high, including the very high categories of governance affecting the quality of life. The study shows that governance varies from village panchayat to village panchayat and altitude zone to altitude zone.

In brief, the very high factor score reported in the northern part of the study area (high and mid-altitude zones) indicates a better governance experience for people. Therefore, the study calls for effective governance policy at the panchayat level to improve the quality of life across the altitude zones.

Pattern of quality of life

Based on 14 variables of quality of life (Table 3) extracted through Principal components analysis, the villages have been ranked and mapped according to the quality of life index (Fig. 2). In this, Renuka Ji village was ranked at the top position (Table 4). This village is well connected with roads mediating to other district blocks. The village supports a small population size but is a famous

pilgrimage of the district. This village scored very well in educational and economic variables. Good educational attainment, good housing conditions and satisfaction of life variables contributed to this village's good quality of life score. Renuka Ji was followed by Sangrah village, a block administrative headquarters. It is the second most populous village of the block. Being the community development block headquarters, it enjoys good educational and health services and many public offices at the block level. Based on the variables, this village performed well on workers associated with the tertiary sector of the economy and healthy physical environment, house type, car ownership and cooking fuel. Nohra village was ranked in third place in the quality of life index. This is the most populous village and has sub-headquarters of the block-level administration. This village falls in the high altitude zone of the block and is endowed with agricultural and forest resources. The moderate slopes and combination of sub-tropical and temperate climates make it favourable for commercial crops like apples, peaches etc. This village has scored high on the quality of the physical environment, satisfaction with access to health services, and percentage of the population educated up to matriculation level and beyond. Bhawai village was ranked fourth in the overall quality of life index. This village is the third most populous village in the study area. Being a populous village, it has access to health and medical institutions within the village. This village scored well in the satisfaction with access to health services, satisfaction with life and percentage of matriculates and above but scored poorly on the variables like room density and RCC buildings.

Table 3: Sangrah Block: Indicators employed in index of quality of life (village level)

Indicators	Definition
Car ownership	Percentage of households with car ownership
Workforce	Total worker engaged in tertiary and above sectors of the economy
Pucca houses	Percentage of households with RCC buildings
Total workforce	Percentage of population in 15-59 age group
Cooking fuel	Percentage of households using LPG as main fuel type
Average household size	Average household size of the village (household members)
Interviewee education	Percentage of interviewee educated graduate and above level
Matriculate and above educated	Percentage of population educated 10 th and above
Head of the household education	Percentage of household head educated graduate and above level
Room density	Total person per room (children taken as half unit)
Satisfaction with physical environment	Respondents reporting satisfaction with environment
Satisfaction with life	Respondents reporting satisfaction with overall life

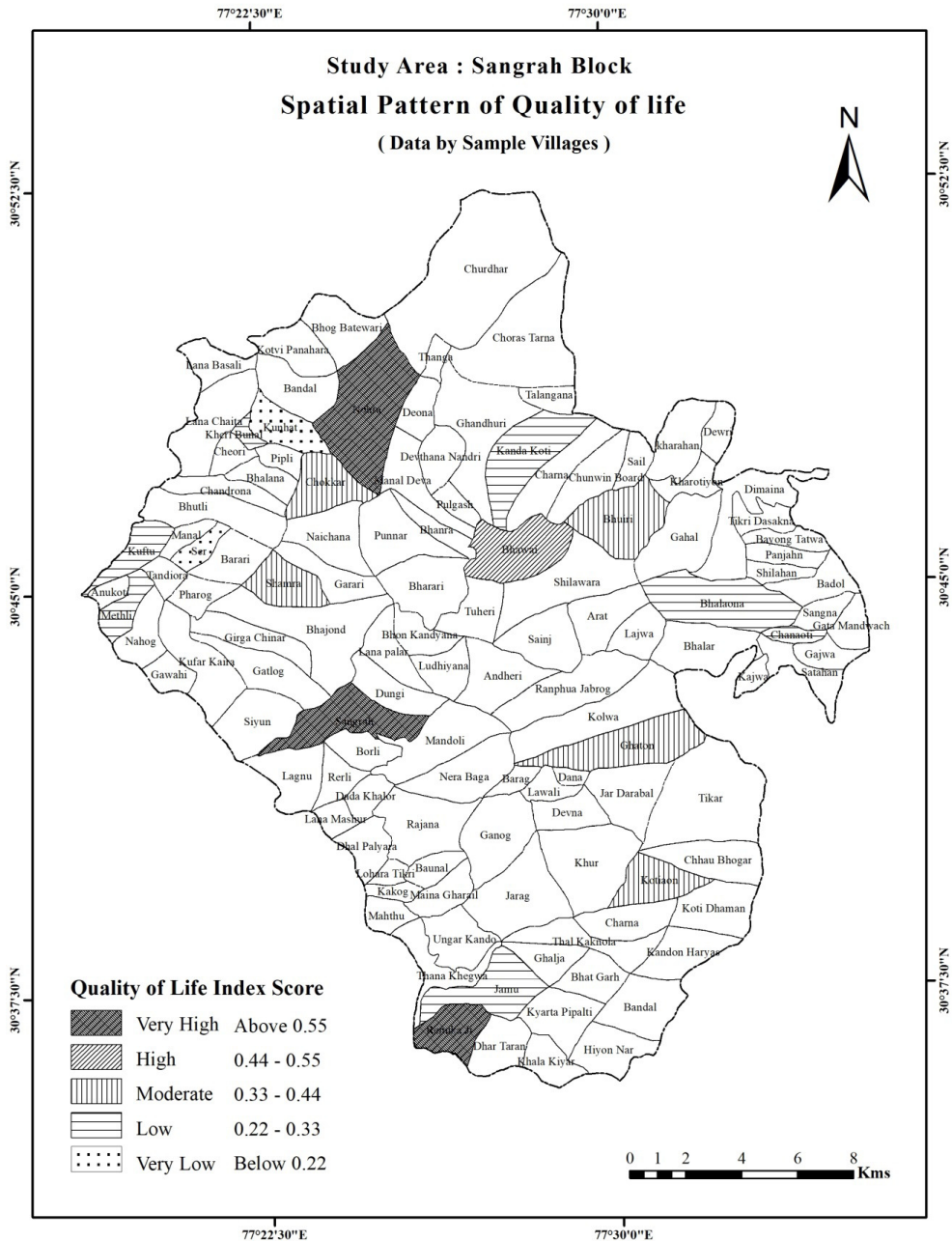
Importance of panchayat meetings	Respondents reporting importance of participation in Panchayat meeting
Access to health services	Respondents reporting satisfaction with access to health services

Source: Compiled by Authors

Table 4: Sangrah Block: Villages by index of quality of life

Village	Population (2011)	Index Score	Rank
Renuka Ji	104	0.65	1
Sangrah	2028	0.64	2
Nohra	2489	0.63	3
Bhawai	2137	0.54	4
Shamra	701	0.39	5
Chokar	1194	0.38	6
Ghaton	863	0.36	7
Kotion	711	0.34	8
Bhuiiri	148	0.33	9
Kuftu	464	0.33	10
KheriBunal	100	0.28	11
Jamu	913	0.27	12
Chanoti	97	0.27	13
Kanda Koti	342	0.26	14
Mithli	143	0.25	15
Bhalona	508	0.24	16
Ser	111	0.20	17
Kunhat	28	0.11	18

Source: Compiled by Authors



Source: Field survey 2018

In the next order are the villages such as Shamra, Chokar, Ghaton, Kotian and Kufu. All these villages are moderately populated. Many of them have access to basic learning facilities but lack healthcare facilities. Therefore, they have underperformed in the variables such as satisfaction with access to medical facilities, house type and main cooking fuel used. The next ranking order comprises the villages with very small population sizes (less than 30 households). In such villages, prominent are Ser, Kunhat, Bhalona, Chanoti, Kanda Koti, Kheribunal and Jamu. These villages are poorly

connected to the road facility, many of which are still not connected with road transport, such as Kunhat and Chanoti. The prominent features of small-sized villages are few households, lack of basic learning and medical facilities, and deprivation of clean water and sanitation provisions.

Unlike small populous villages, villages with large populations benefit from access to the basic medical and educational infrastructure for a long time as these villages fulfil the government norms of instituting such facilities. However, this drives the small villages a step back compared to large villages regarding access to basic facilities. The study, therefore, calls for devising a small village development policy to improve the quality of life of its inhabitants.

Conclusions

The study identifies the determinants of quality of life and their spatial distribution across three altitudinal zones. To capture the real picture of the quality of life, subjective and objective dimensions are necessary to understand the application. Since objective or subjective aspects alone cannot reveal the totality of life experience and essence of people residing in a particular area for a long time. Based on the principal components analysis results, the governance factor emerged as the main determinant of quality of life, followed by health, occupation & income, cleanliness & standard of living, satisfaction with life etc. This indicates that as per the experiences and aspirations of people living and working there, the economic aspect does not figure as the main determinant of the good life in the study area.

The spatial statistics of both dimensions are necessary to understand the regional pattern of quality of life. The spatial distribution of factor score portrays that the high factor score reported in the northern part of the study area (high and mid-altitude zones) indicates a better governance experience for people. While addressing the issue of quality of village life, quality of life index results show that the advantage of being the administrative headquarters of the study area, physical nearness of various administrative and public offices, availability of educational and health facilities in low altitude zone two villages namely Renuka Ji and Sangrah maintain top two ranks in the quality of life index. The second important driver that impacted the quality of life at the village level is the demographic factor, as large populous villages have a better quality of life rank than small villages. It is discovered that large villages enjoyed a greater degree of having basic educational and medical facilities within village boundaries for a long time, whereas the small villages lack basic minimum facilities such as road connectivity. Similar results have been observed by Thakur (2011) that spatial variations in the quality of life are largely related to geographical accessibility and, thereby, availability and use of physical and social infrastructural amenities and services (p.62).

The index surely may help policymakers combine subjective and objective aspects to understand the essence of quality of life and identify the good or poor performing areas. The study calls for the policymakers to revisit the social policy for effective governance, particularly in the low altitude zone that showed a preponderance of very dissatisfied respondents with the quality of governance. Although the results are not definite, they are indicative as it is subjected to data availability, people's perception and the limits of statistical analysis.

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Experience of Public Healthcare System in Recovery of Covid-19 Pandemic: District Level Evidences from Madhya Pradesh

P. K. Sharma¹ and D. Tiwari

Abstract: This paper attempts to provide insights into the impact of COVID-19 on the public health care system (PHS), proactive measures taken for it, potential solutions, and focus areas for the coming days. Ever since the first case of COVID-19 was reported in India on January 30, 2020, and in Madhya Pradesh on March 20, 2020, attempts were made to operationalise several of these measures, but COVID-19 seems to have overtaken the functioning of health services. This paper analyses the qualitative and quantitative status of the public healthcare system in Madhya Pradesh, selecting five healthcare centres—SC, PHC, CHC, SDH, and DH. The Healthcare System Weightage Score (HSWS) is calculated to analyse the correlation between weightage score and recovery rate from COVID-19. Based on weightage scores ranging from 2.04 to 7.68, districts were categorised as high-6, moderate-20, low-20, and very low level-5 districts in the level of the healthcare system (HS). It is suggested that the accessibility and availability of functional medical facilities affordable to every person must be insured, especially in the rural areas of the study region, to mitigate the pandemic.

Keywords: COVID-19, Healthcare System, Accessibility, Weightage Score, Recovery rate

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Introduction

The Novel Coronavirus (SARS-CoV-2) outbreak has significantly impacted daily life and healthcare systems worldwide, including in India (Iyengar et al., 2020). During the last two years, the focus has been moved from critical infrastructure protection to responding resiliently to the COVID-19 pandemic. This crisis creates a stressful situation in the Indian health system (Golechha, 2021). India attempted to operationalise several of these measures, but COVID-19 seems to have overtaken the functioning of health facilities (Husain et al., 2020). Lockdown imposes a substantial economic and humanitarian burden on societies, particularly in developing countries, that persists even after the epidemic dies out. (Dixit et al., 2021). The first case of COVID-19 in India was reported on January 30, 2020, and in Madhya Pradesh on March 20, 2020. Currently, 60 per cent of India's population lives in rural India. To provide healthcare facilities to the people living in rural India, the government has established 25743 Primary Health Centers, 158417 sub-centres, and 5624 Community Health Centers.

The magnitude of the coronavirus disease (COVID-19) outbreak is exponentially growing worldwide, inflicting significant mortality and morbidity. Like different global components, India is also suffering from the COVID-19 crisis. Mitigation Strategies via Way of Means India Government of India has been proactive in making plans and implementing guidelines to curtail the coronavirus disorder spread. The containment plan of the Ministry of Health and Family Welfare outlines the scenario-primarily based, totally strategic method to contain COVID-19 spread. It entails an advisory on social distancing measures, suspension of mass gatherings, social media for public awareness, cluster containment, COVID-19 trying out and treatment, vaccine trials and non-pharmacological

¹ Corresponding Author

interventions, remaining of faculty and colleges, suspension of public transport (trains/ buses) and COVID-19 instance handler's quarantine. Furthermore, India advocates worldwide collaboration to address the relentless virus spread.

A sound healthcare system delivers quality services to all people when needed, and it needs a well-trained workforce and well-maintained health facilities to deliver quality medicine and treatment (Anayah et al., 2021). Good health means higher labour productivity, increased well-being, and enhanced economic growth (Goel et al., 2020). Differences in health spending result in significant variations in health infrastructure in terms of hospitals, beds, ventilators, etc., across the states (Davalbhakta et al., 2020). At the same time, an ever-widening socio-economic gap between high and low-income households poses challenges to achieving the societal goal of equal health status and access to health care (Saikia, 2014).

The National Health Policy (NHP) 2017 advocates for exploring the role of Public-Private Partnership (PPP) in achieving Universal Health Coverage (Ghei et al., 2015). While about 70 per cent of India's population lives in rural areas, only 20 per cent of hospital beds are in rural areas (Taqi et al., 2017). Indeed, intra-urban disparities in health are not unique to India and have been shown to exist in other cities in developing as well as developed countries (Chatterjee & Laha, 2016). Also, healthcare infrastructure is an important indicator for analysing the country's healthcare policy and welfare mechanism.

Thus, the objective of providing good health to every Indian can only be viable through government as well as non-governmental initiatives where the government provides financial aid through various schemes and the non-governmental institution supplies medicine and medical equipment (Jana & Harata, 2016). The main reasons are the non-availability of health workers, inadequate infrastructure and facilities (Sarkar & Chouhan, 2021). Although it is impossible to transform primary health care in a day, week, or month, the proper steps in this direction will help in the future (Vij, 2019). Healthcare systems are services for diagnosing, treating, or caring for someone suffering from a physical or mental illness, injury, or disability. This includes procedures similar to any form of medical, dental, or surgical care but is not offered in connection with medical conditions and other government-notified services. A health system, also known as a healthcare system, is an organisation of people, institutions, and resources that provide health services to meet the health needs of target groups. Health facilities are hospitals, public health centres, and other public health facilities' providers on or near the site for healthcare provision.

The health infrastructure requires radical reform to deal with the challenge of developing the appropriate infrastructure in rural areas. The need is strengthening them and enabling them with an input mix of facilities, supplies, and human resources based on a real-time information system. The present study is an endeavour to analyse the public health care system in Madhya Pradesh.

The study area

Madhya Pradesh is situated in the central part of India between the latitude of 21.6°N to 26.30°N and longitude of 74°9'E to 82°48'E. According to the 2011 census, the state has a population of 72,597,565. Madhya Pradesh is divided into 51 districts for administrative purposes. These districts are arranged into ten divisions. The health system in Madhya Pradesh consists of a three-tier structure having primary, secondary, and tertiary healthcare (Chauhan et al., 2016).

According to Rural Health Statistics, at least 40 per cent population of Madhya Pradesh is entirely dependent on district hospitals for health services. Only eight districts have government facilities as per the required number of doctors. The number of sub-centres is 10226, Primary health centres are 1420, Community health centres are 324, Sub-divisional hospital is 72, District hospital is 51, and the number of beds available in public facilities is 38140 (Basak & Siddique, 2019). Access to sanitation conditions is relatively poor. However, various development schemes have been implemented to eradicate health issues in the region.

Objectives

In light of the preceding statements, the study's objective is to mark the ground reality about the availability of PHS during the pandemic in rural areas of the state and suggest an appropriate strategy for balanced health equality in the region. Therefore, the primary objectives of the study are to:

1. Find out the Healthcare System Weightage Score (HSWS) for each health system and determine the district-wise PHS.
2. To correlate the availability of PHS and the COVID-19 recovery rate.

Research questions

The study raises the following research questions for their answer with the help of data analysis.

1. What has been the public healthcare system's role in recovering from the COVID-19 pandemic?
2. Do major healthcare centres like Bhopal and Indore play an effective role in reducing the death rate?

Database and Methodology

The study has been conducted based on the secondary database collected from the Census of India, 2011 Rural Health Statistic of Madhya Pradesh 2019, National Health Profile 2020, National Family Health Survey 2019-21 (NFHS-5) and the official websites of different government departments of Madhya Pradesh state. As a result, all the hospitals, including sub-centre (SC), Primary Health Centre (PHC), Community Health Centre (CHC), Sub Divisional Hospitals (SDH) and District Hospitals (DH), have been considered part of the public health care system.

Case fatality rates (CFRs) and case recovery rates (CRRs) are frequently used to describe fitness outcomes associated with specific disease epidemics, such as the COVID-19 pandemic is the proportion of deaths due to a specified health condition compared to total infected cases. CRR is the proportion of recovered or discharged individuals with a specified health condition compared to total infected cases. (Khafaie, 2021). It is notated as:

$$C_j = \frac{X_1}{X^*1} + \frac{X_2}{X^*2} + \frac{X_3}{X^*3} + \dots + \frac{X_i}{X^*i}$$

$$= \sum_{i=1}^n \frac{X_i}{X^*i}, \dots \dots \dots (2)$$

Where X_i represents the i^{th} value of variable X and X^*i is the mean of the same variable. According to Battegay et al., we used the proportion of total deaths and recovered cases of COVID-19 to total disease cases at global and national levels to estimate CFRs and CRRs, respectively. $CFR = \frac{\text{Total deaths attributed to COVID-19}}{\text{Total cases of COVID-19}} * 100$

$$CRR = \frac{\text{Total recovered individuals attributed to COVID-19}}{\text{Total cases of COVID-19}} * 100$$

The analysis carried out in the present paper is both quantitative and descriptive. The availability of healthcare infrastructure is one of the most important components of the study. The methodological steps followed in the present study are:

1. Identification of the status of the public health care system through the weightage score method.
2. Karl Pearson's equation has been applied to establish the correlation between the district score and the COVID-19 recovery rate.
3. All the districts have been categorised into the four levels of PHS according to their PHS score.

Result and Discussion

This paper examines the district-wise status of a public health care system in Madhya Pradesh. The weightage of the healthcare system is calculated for all five types of PHS available in the state.

Table 1: Public healthcare system weightage score of Madhya Pradesh (HSWS)

Health Care System	Weightage Score
Sub Centre (SC)	200.5
Primary Health Centre (PHC)	28.9
Community Health Centre (CHC)	6.47
Sub Divisional Hospital (SDH)	1.64
District Hospital (DH)	1.000

Source: Computed by authors

The Sub Centre scored the highest score with 200.5, whereas the District Hospital has the lowest weightage score with a value of 1.000. HSWS calculates the district-wise healthcare index to compare the mortality and recovery rate from COVID-19. For instance, in the Agar Malwa district, its subcentre value is 77, divided by the mean sub centres value of 200.5 to get a value of 0.38 (Table 2).

The total HS score is found by adding the values of all the indicators corresponding to one district. For instance, the total HS Score for Agarmalwa stands at 2.04, the sum of corresponding individual weightage scores of 0.38,0.20,0.46,0, and 1 (Table 2). Accordingly, among the 51 districts of Madhya Pradesh, Chhindwada district records the highest position in respect of total HS score with a composite score of 8.96, followed by Dhar with 8.01 and the lowest in Agar Malwa with 2.04 (Table 2).

Table 2: District-wise public healthcare system score of Madhya Pradesh

District	SC	PHC	CHC	SDH	DH	Total score	Death rate	Recovery rate
Agar Malwa	0.38	0.20	0.46	0	1	2.04	2.05	97.94
Alirajpur	0.90	0.54	0.92	0	1	3.37	1.3	96.6
Anuppur	0.82	0.61	1.23	0	1	3.67	0.9	99.06
Ashok Nagar	0.64	0.37	0.30	1.21	1	3.54	1.5	98.4
Balaghat	1.43	1.29	1.07	1.82	1	6.62	0.7	99.1
Barwani	1.61	1.02	1.23	1.21	1	6.08	1.07	98.8
Betul	1.58	1.22	1.38	0.60	1	5.79	2.1	97.6
Bhind	1.02	0.95	1.07	0.60	1	4.66	1.06	98.8

Bhopal	0.32	1.76	0.30	1.82	1	5.22	0.7	99.0
Burhanpur	0.48	0.51	0.61	0	1	2.60	1.5	98.4
Chhatarpur	1.15	1.36	1.54	0	1	5.05	1.1	98.6
Chhindwada	1.49	2.34	1.69	2.42	1	8.96	1.7	96.0
Damoh	0.86	0.61	0.92	0.60	1	4.00	2.2	96.5
Datia	0.53	0.44	0.61	1.21	1	3.81	1.1	98.7
Dewas	1.02	0.85	1.07	1.21	1	5.16	0.6	99.3
Dhar	2.32	1.76	2.31	0.60	1	8.01	1.03	98.8
Dindori	0.93	0.74	1.07	0	1	3.76	0.6	99.2
Guna	0.78	0.64	0.77	0.60	1	3.80	0.8	99.0
Gwalior	0.58	1.87	0.46	2.42	1	6.34	1.1	98.7
Harda	0.38	0.23	0.61	0	1	2.24	1.8	98.0
Hoshangabad	0.76	0.57	0.92	1.21	1	4.48	0.9	98.9
Indore	0.56	1.97	0.92	1.82	1	6.28	0.9	98.9
Jabalpur	0.87	1.73	0.92	1.82	1	6.35	1.3	98.5
Jhabua	1.43	0.71	0.77	1.21	1	5.12	0.8	99.1
Katni	0.79	0.68	0.92	0.60	1	4.00	1.2	98.6
Khandwa	0.88	1.05	1.07	0.60	1	4.62	2.3	97.6
Khargone	1.55	2.14	1.54	1.21	1	7.44	1.7	98.0
Mandla	1.34	1.15	1.23	0.60	1	5.33	0.4	99.4
Mandsaur	0.88	1.36	1.07	1.21	1	5.53	0.9	99.0
Morena	1.16	0.91	1.07	1.82	1	5.97	1.1	96.7
Narsinghpur	0.66	0.78	1.07	0.60	1	4.13	0.7	99.2
Neemuch	0.50	0.61	0.46	1.21	1	3.79	1.06	98.7
Panna	0.75	0.57	0.92	0	1	3.26	0.8	99.0
Raisen	0.91	0.71	1.07	1.82	1	5.52	2.1	97.8
Rajgarh	1.05	1.02	0.77	2.42	1	6.27	1.9	97.6
Ratlam	0.96	1.02	0.92	1.21	1	5.12	2.1	97.6
Rewa	1.54	1.36	1.38	1.82	1	7.11	0.9	99.0
Sagar	1.30	1.39	1.69	1.82	1	7.21	2.3	97.3

Satna	1.51	1.7	1.38	1.21	1	6.81	1.1	96.8
Sehore	0.79	0.81	1.23	1.21	1	5.06	0.7	99.2
Seoni	1.38	1.08	0.77	1.82	1	6.06	0.4	99.4
Shahdol	1.14	1.02	1.07	0.60	1	4.84	1.1	98.7
Shajapur	0.57	0.57	0.61	1.82	1	4.58	1.1	98.8
Sheopur	0.52	0.40	0.462	0	1	2.39	1.9	98.0
Shivpuri	1.28	0.51	1.38	0	1	4.18	1	98.9
Sidhi	0.96	0.95	0.92	0	1	3.83	0.9	96.0
Singroli	1.00	0.51	1.07	0	1	3.59	0.9	99.0
Tikamgarh	1.01	0.81	1.07	0	1	3.90	1.6	98.0
Ujjain	1.01	1.25	0.77	3.64	1	7.68	0.9	99.0
Umaria	0.60	0.44	0.46	0	1	2.51	1	96.9
Vidisha	0.98	0.91	1.07	1.21	1	5.19	1.9	97.9

Source: 1. Rural Health Statistic of Madhya Pradesh 2019-20 (number of healthcare systems)

2. Department of Public Relations, Madhya Pradesh (COVID-19 cases)

3. Computed by the author (weightage score, death rate and recovery rate)

Note: Individual weightage score = Individual attribute value/ Mean attribute value

Total Healthcare system Score = Summation of individual quotient values (the higher the score, the higher the level of the healthcare system)

Table 2 reveals that on the one hand, Seoni, Mandla, Dindori, and Guna have been recorded as the lowest number of death, and on the other hand, Indore, Bhopal, Jabalpur, and Gwalior have recorded the highest number of deaths for the reason of no proper testing, tracing and a more significant number of sugars-blood pressure patient. The total number of deaths varies from district to district, but the recovery rates have almost the same trends among the districts. According to the Karl Pearson correlation coefficient method, the intensity of the linear relationship between healthcare system scores and recovery rate is 0.05, which indicates a lower degree of correlation between them due to high vaccination coverage in the minimum time frame.

The sum of the weightage scores of sub-centres, Primary Health Centres, Community Health Centres, Sub Divisional Hospitals and District Hospitals is recognised as the total score of the particular district. The HS score value varies from 2.04 to 8.96.

Based on the healthcare system score (HSS) values, the districts have been grouped into four categories high, moderate, low and very low (Table 2), reflecting the relative levels of healthcare infrastructure. The high-level HS category includes districts that have scored more than 7.00 and include six districts, namely Chhindwara, Dhar, Ujjain, Rewa, Sagar, and Khargone. The moderate level category includes 20 districts, with scores ranging between 5.00 and 7.00. The majority of District 20 is marked under the low-level category, which has a score ranging between 3.00 to 5.00.

Finally, the very low category districts scored less than 3.00 score which includes five districts, namely Umaria, Sheopur, Harda, Burhanpur and Agarmalwa.

Table 3: Level of healthcare system of Madhya Pradesh

Healthcare system score	Level of the healthcare system	Number of districts	Name of District
Above 7.00	High	6	Chhindwara, Dhar, Ujjain, Rewa, Sagar, Khargone
5.00-7.00	Moderate	20	Vidisha, Satna, Sehore, Seoni, Ratlam, Mandla, Mandsaur, Morena, Indore, Jabalpur, Jhabua, Gwalior, Dewas, Betul, Barwani, Balaghat, Bhopal, Chattarpur, Raisen, Rajgarh.
3.00-5.00	Low	20	Tikamgarh, Singrauli, Sidhi, Shivpuri, Sajapur, Shahdol, Panna, Neemuch, Narsighpurkatni, khandwa, Hosagabad, Dindori, Guna, Damoh, Datia, Bhind, Ashoknagar, Anuppur, Alirajpur
Below 3.00	Very low	5	Umaria, Sheopur, Harda, Burhanpur, Agarmalwa

Source: Computed by author

Based on this categorisation, a map has been produced to show different levels of the HS and COVID-19 recovery rates as shown in the map. The recovery rate ranged from a high of 99.4 per cent for Mandla and Seoni to a low of 96 per cent for Chhindwara and Sidhi districts, giving a range difference of 3.4. The districts have been grouped into four categories high(above 99 per cent), moderate (98-99 per cent), low (97-98 per cent)and very low(below 97 per cent) recovery rate in the COVID-19 pandemic.

High level

Only six districts out of fifty-one with a score index value of >7.00 fall into this category (table.3). The index value ranged from a high of 8.96 for Chhindwara to a low of 7.11 for Rewa district, giving a range difference of 1.85 between the two. It indicates that employees of health centres had been actively participating in vaccination supply to the population of that area—efficiency and accessibility of healthcare infrastructure in terms of population coverage. There is better connectivity in the healthcare centres at different levels. Although PHS is available and affordable to almost all population segments.

Moderate level

Twenty of the fifty-one districts with a score index of 5.00-7.00 fall in this category. The index value ranged from a high of 6.81 for Satna to a low of only 5.05 for Chhatarpur district, giving a range difference of 1.76. Thus, it shows that a healthcare system aims to provide healthcare facilities to the people, thereby improving their health status. This is possible due to awareness campaigns by the government, door-to-door vaccination, school and drive-in vaccination, and the appointment of nodal officers to maintain rules and regulations of COVID guidelines.

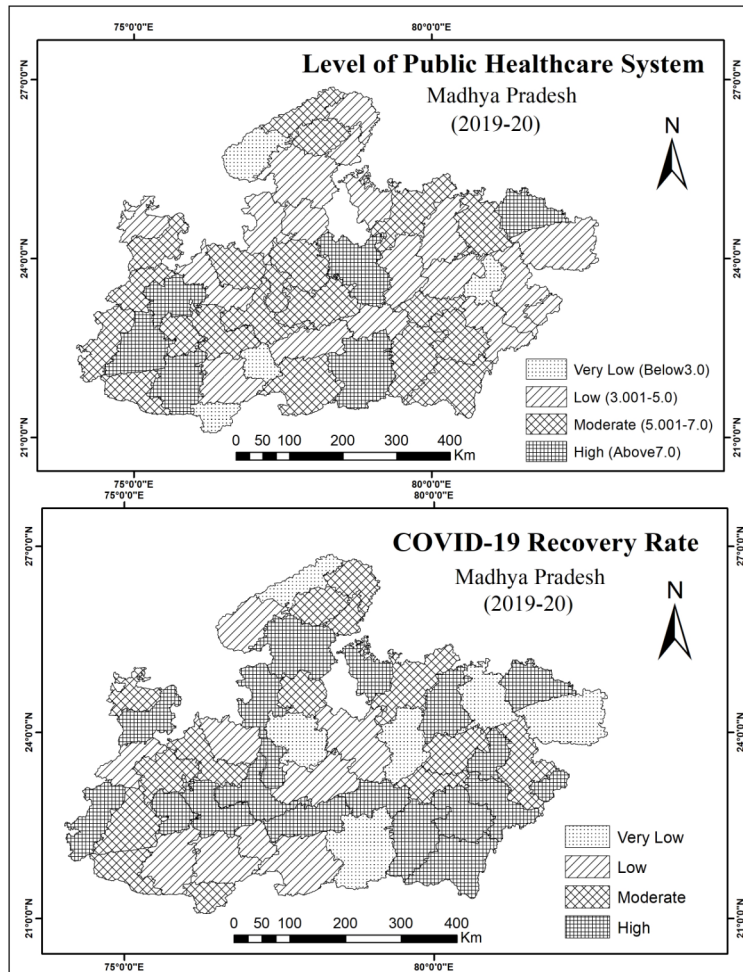


Fig.1

Low level

Twenty of the fifty-one districts with a score index of 3.00 to 5.00 fall in this category. The index value ranged from a high of 4.84 for Shahdol to a low of only 3.26 for the Panna district, giving a range difference of 1.58 between the two. In these districts, proper government guidelines were not followed. It indicates that health infrastructure is an important indicator for understanding a region's healthcare delivery provisions and welfare mechanisms in low-level districts. Infrastructure has been described as the basic support for delivering public health activities. In this sense, their role should facilitate community participation and involve them in the necessary actions to address the social and cultural barriers that lead to poor health.

Very low level

Five of the fifty-one districts with a score index of < 3.00 fall into this category. The index value ranged from a high of 2.60 for Burhanpur to a low of only 2.04 for Agarmalwa district, giving a range difference of 0.56. It has a hybrid healthcare system, including public and private healthcare providers. However, most private healthcare providers are concentrated in urban areas, providing secondary and tertiary healthcare systems. The major issues in rural healthcare are inadequate health

infrastructure, lack of proper healthcare facilities and skilled human resources in the existing health centres.

Vaccination

Before the availability of vaccines, nations, in large part, trusted mobility and tried to mitigate the COVID-19 pandemic. The first protection and efficacy outcomes for vaccines in opposition to SARS-CoV-2 have been posted between the end of 2020 and the start of 2021. The outcomes show that vaccination saved 30 thousand people. In summary, the outcomes endorse that each vaccination rule has been important in decreasing both the spread and the number of deaths. Vaccination decreased the general death rate to 4.6 per cent from 9.0 per cent in Bhopal, Indore, and other major districts.

Vaccination significantly reduced unfavourable outcomes, with non-ICU hospitalisations, ICU hospitalisations, and deaths decreasing from 63.5 to 66.7 per cent, 65 to 68.6 per cent, and 69.3 to 73.1 per cent, respectively, over the same period.

In Madhya Pradesh, residents have the right to enter the COVID-19 vaccine. Covishield (Oxford-AstraZeneca) is the primary vaccine administered. This vaccine is given in doses 12 to 16 weeks apart. As of May 16, 2021, Madhya Pradesh has reached and succeeded in its aim of 179,000 human beings vaccinated to 182,378 human beings vaccinated. As of August 13, 2021, COVID-19 vaccines had been administered to 36,739,380 people in Madhya Pradesh. As of August 14, 2021, Madhya Pradesh has shown a total of 791,998 cases and has recorded 10,514 deaths. Some findings suggest that there has been significant improvement in the rural healthcare infrastructure, especially in the case of health centres in the region, after the implementation of NRHM in 2005.

NRHM mission was completed via key countrywide programs, namely, the National Disease Control Programs (NDCP) and the Integrated Disease Surveillance Project (IDSP). NRHM additionally enabled mainstreaming AYUSH, i.e., Ayurvedic, Yoga, Unani, Siddha and Homeopathy health structures. As a result, the public health expenditure in India declined from 1.3 per cent of GDP in 1990 to 0.9 per cent in 1999. In 2009-10, the country's general public expenditure on health as a percentage of GDP was around 1.1 per cent, up from 0.96 per cent in 2005-06. There was a 30 to 40% increase in institutional transportation during the early post-NRHM period of 2007-08 (383%) and late post-NRHM period of 2011-12 (65.5%), respectively, from the pre-NRHM Period of 2000-04 (24.8%), as opposed to a seven-percentage point increase in the pre-NRHM Period from pre-NRHM Period 1 of 1995-99 (18.5%).

Public health infrastructure has the nerve centre of the public health care system'. The recent pandemic of COVID-19 has been a wake-up call not only for the public health realm but also for working towards strategies for mitigating pandemics, which is now a top global public health priority. Healthcare infrastructure is also important for understanding any health system's provisioning and working. According to the national health profile, the state government has set itself a target of administering both doses of the COVID-19 vaccine to the entire eligible population. The four components of surge capacity are staff, supplies, space and structure. The private health sector is small, concentrated in urban areas and unaffordable for most (Chokshi et al., 2016).

Conclusion

Addressing a newly emerged pandemic is a challenging task. To explore the status of healthcare facilities to mitigate the impact of COVID-19, accessibility and availability of medical facilities are much required in pandemic situations. It should be ensured that every village must have at least one medical centre with proper functional facilities. Overall analysis shows that socio-economic factors are an indivisible part of addressing the COVID-19 pandemic. Vulnerability assessment using an HS index can provide an understanding of real-world situations. The low HS score districts should be prioritised based on their unprivileged health infrastructure. Finally, more research is needed for a more inclusive outcome.

The states and national stakeholders must rethink the rural public health infrastructure development and create health advisory bodies to review the post-acute sector's response, identify

opportunities to improve performance going forward and develop a pandemic response plan for post-acute care providers. (Hebbar et al., 2020). This article attempts to provide insights into how COVID-19 has impacted the public health care system, what measures have been taken proactively and what could be potential solutions and focus areas for the coming days.

The evaluation shows that authorities' spending is crucial to enhancing the healing rate. There may be numerous doable causes for this. A growth in health spending factors in the direction of a more evolved financial system, and it can additionally be instrumental in supplying higher checking out and screening facilities. Large-scale testing could help determine cases and, as a result, in treatment and healing.

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Child Malnutrition and its Association with Socio-Demographic Determinants: A Case Study of Baruipur Block, South 24 Parganas, West Bengal

Shovan Ghosh and Ananya Kayal¹

Abstract: Health is one of the most important indicators of human development and a strong pillar of the overall development of any country. While healthy children are key to future development, child health in developing countries is unsatisfactory and largely neglected. With this in mind, the paper opts to scrutinise the issue of the nutrition status of children in rural areas of Baruipur block of South 24 Parganas district of West Bengal. The main objectives of this study are to assess the nutritional status of children below six years of age in this area and, secondly, to identify the determinants of this status. The study was conducted on 100 children below six years based on simple random and purposive sampling. The Z-score method has been used to assess anthropometric measurements such as stunting, wasting, and underweight. In addition, Chi-square tests analyse the relationship of anthropometric measurements with various socio-demographic and maternal and child health indicators. This study reveals that the state of child nutrition in the area is unacceptable. It is also clear that various socio-demographic and maternal and child health indicators significantly affect child nutrition.

Keywords: Stunting, Wasting, Underweight, Nutritional status

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Introduction

Health is one of the most important indicators of human development and an important strong pillar of the overall development of any country. Healthy children are the potential assets of any country. However, the state of child health in developing countries is unsatisfactory and remains neglected. Childhood malnutrition is a major burning issue in developing and underdeveloped countries. Developing countries, like India, are also plagued by this problem. Childhood malnutrition adversely affects the child's normal growth and increases the tendency for mortality and morbidity. It also often acts as a barrier to children's normal physical and mental growth and development later in life (Alderman et al., 2003). Malnutrition during childhood is one of the leading determinant factors of infant mortality in low and middle-income countries. According to Park (2005), about 70 per cent of all child deaths in India are due to various infections, diarrhoea and malnutrition. The risk factor of malnutrition is highest among children living in tribal and rural areas of India. Improper nutritional conditions, sanitation problems, low hygienic practices etc., play an important role (Meshram et al., 2016). The three most commonly used internationally recommended anthropometric indicators are stunting (low height-for-age), underweight (low weight-for-age) and wasting (low weight-for-height). According to the NFHS-4 report (2015-16), the proportion of stunting, wasting and underweight in India is 38, 21 and 36 per cent, respectively. On the other hand, the percentage of stunting, wasting and underweight in West Bengal is 32, 20 and 32 per cent, respectively. Also, at South 24 Parganas, it is 27, 20 and 28 per cent, respectively. The rates of stunting, wasting and being underweight in

¹ Corresponding Author.

West Bengal are 34, 20 and 32 per cent, respectively (NFHS 5, 2019-2021). The stunting rate of children has increased by 2% from 2015-16 (NFHS 4) to 2019-21 (NFHS 5), but the rate of wasting and underweight remains the same since NFHS 4. Similarly, in South 24 Parganas, these rates are 36.7, 21.2 and 32.2 per cent, respectively. As per the NFHS 5 report, the rate of child malnutrition in South 24 Parganas has increased compared to previous years. Stunting, wasting, and being underweight in this district increased by 9.7, 1.2 and 4.2 per cent, respectively, over the previous year (2015-16). According to the reports (NFHS), the graph of children's malnutrition in India and West Bengal is declining, but it is still a crucial issue in Indian society.

Objectives

The objectives of this paper are as follows:

1. To assess the nutritional status of children below six years in the rural areas of Baruipur Block.
2. To identify the socioeconomic and demographic determinants of the nutrition status of children below six years in the study area.

Study Area

West Bengal is a state of Eastern India along the Bay of Bengal. The state lies between 85°50' to 89°50' East longitude and 21°25' to 27°13' North latitude. It is the fourth largest state in terms of population and 14th in terms of area. The climate of the country and the state is 'Tropical Monsoon' in nature. Although the southern part of the state bears a Tropical Savana climate, the northern part supports Humid Subtropical. The state's main river is the Ganges, but the numerous rivers originated from the hilly areas in the north, and the plateaus in the west have enriched the state with water resources. Favourable climatic conditions, fertile riverine soil, the abundance of water resources etc., have helped the state to become known as one of the major agrarian states in the country. Agricultural activities comprise about 63 per cent of the total geographical area of the state (Maji and Sharma, 2017). Currently, the state ranks first in the country in producing paddy, jute and vegetables. It also ranks second in potato production (Department of Agriculture, West Bengal, 2022). The entire state exhibits six Agro-Climatic regions depending on the variation of soil and climate.

Agriculture is mainly affected by monsoonal rainfall. Due to the uncertainty of monsoon rains, many state districts face natural disasters like drought and floods almost yearly. Howrah, Hooghly, West Midnapore, Burdwan, North and South 24 Parganas districts are prone to floods. On the other hand, the drought situation is very typical in Purulia and Bankura districts. The variability in monsoonal rainfall is the primary reason for drought and flooding in this region. The effects of the cyclone are also widespread in the state. Multiple cyclones that form in the Bay of Bengal during the summer each year cause extensive damage to the coastal states of India, including West Bengal. Cyclone 'Yaas', which struck on May 26, 2021, has profoundly affected West Bengal and South 24 Parganas (22°31'48"N, 88°19'48"E). South 24 Parganas is a district of the southern part of West Bengal along the Bay of Bengal. It is the largest district of the state in terms of area and the second largest by population. Several districts, including South 24 Parganas, were inundated, severely damaging agricultural production. Many other issues, such as low per capita land area, increase in the use of excess chemical fertilisers, the salinity of land due to excess irrigation and ingress of saline ocean water into the land, intensive and conventional farming methods, poor food storage facilities etc., are hindering the improvement of agriculture in the state as well as the district South 24 Parganas.

Baruipur block is a critical Community Development Block of the Baruipur Sub-division of South 24 Parganas district, West Bengal, India. This Block lies between 22°21'56"N and 88°25'57"E with an average elevation of 9 meters or 30 ft. This Block is surrounded by the Sonarpur C.D block in the north, the Canning I C.D. block in the east, the Jaynagar I C.D. block in the south, the Magrahal II and Bishnupur I C.D. block in the west. It is a rural-urban fringe area. The total area of this Block is 226.16 sq. km. This Block contains one panchayat samiti, 19-gram panchayats, 138 mouzas and 122

inhabited villages (District Statistical Hand Book, South 24 Parganas, 2014). According to the 2011 census of India, the total population of this Block is 4,33,199, which is about 5% of the total district population, 51% male and the remaining 49% female. The population density and sex ratio of this Block are 1900/sq km and 958, respectively. The population density and sex ratio of this Block are 1900/sq km and 958, respectively. The total literacy rate is 67.27%, of which male literacy is 55% and female literacy rate is 45%. There are 12 children in the age group 0-6 in the Block's population. The working and non-working population percentages are 36% and 64%, respectively. This Block possesses one block primary health centre, two primary health centres, 48 sub-centres and one family welfare centre. Table 1 shows some important health parameters.

Table 1: Block at a glance in terms of health parameters

Doctor-Population Ratio	1:19687
Population served per Sub-Centre	9023
Population served per Primary Health Centre	216560
Number of Beds per 1000 Population	0.28
Number of Primary Health centres per 100 sq km.	0.88
Number of Sub-Centre per 100 sq km.	21

Source: District Census Handbook, 2011

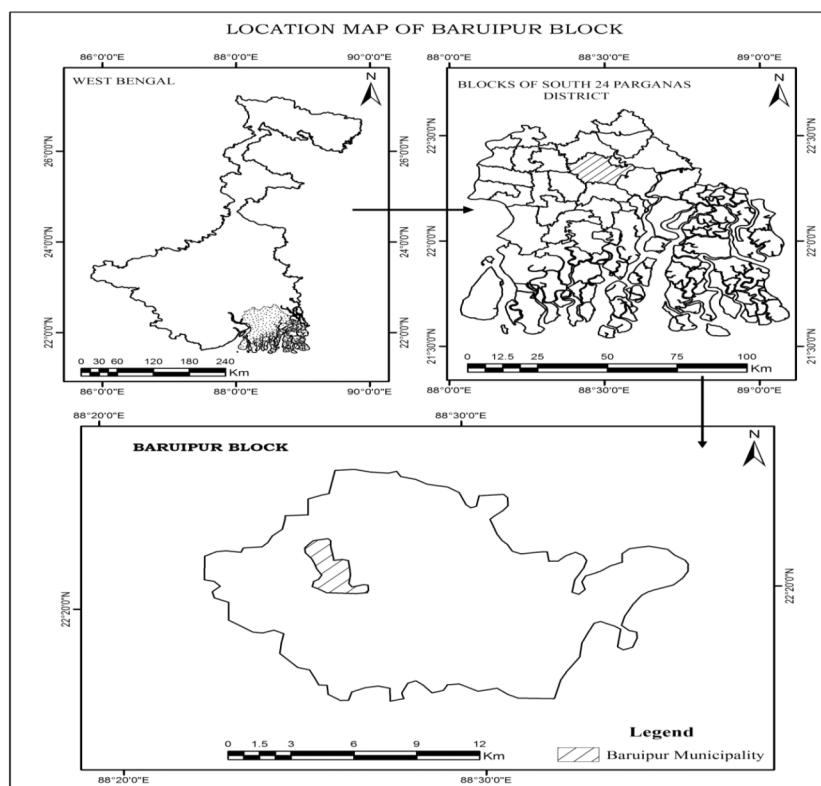


Figure 1: Location Map

Source: Computed by Authors, 2021

Methodology and Database

A cross-sectional study was conducted to assess the nutritional status of 0-6 years old children in the Baruipur block through a questionnaire survey in August 2021. Based on the distribution of different socio-demographic criteria, e.g., literacy rate, percentage of scheduled caste and scheduled tribe, population, number of child population etc., out of 19 Gram Panchayats in Baruipur block, six have been selected for data collection. The respondents collected samples from selected Gram Panchayats using the Simple Random Sampling method. In this case, the mothers whose children are under six years of age comprised the sample population. 100 mother and child pairs were selected as samples from the survey area. Some socio-demographic and child health-related data were collected through a questionnaire survey. Children's height and weight are also measured to create an anthropometric profile. The children's heights were measured with the help of measurement tape, and the weight was measured with the help of a digital weight machine. In addition, birth certificates and polio cards have also been used to collect information about the birth characteristics and immunisation status of children. The surveyed data has been analysed through various statistical techniques and hypothesis testing methods. Here are some descriptive statistics, Z score and Chi-square data analysis methods. The Z score method was used to determine the nutritional status of children, like height/length-for-age Z score (H.A.Z.), weight-for-age Z score (W.A.Z.) and weight-for-height Z score (W.H.Z.). The WHO standard reference determined the nutritional status of children, such as moderately and severely stunted, wasted and underweight.

According to WHO, if the children's height-for-age z-score is below -2 S.D., they are considered moderately stunted, and if the z-score value is below -3 S.D., then they are considered severely stunted. In this same way, WHO has classified underweight and wasting (Table 2). Conversely, the chi-square test was used to show the association of anthropometric measurements with different socio-demographic and child health indicators. The software 'IBM-SPSS Statistics 26' treated the data statistically.

Table 2: Classification of stunting, wasting and underweight according to WHO, 2005

Z-Score Range	Stunting (Height-For-Age)	Underweight (Weight-For-Age)	Wasting (Weight-For-Height)
Up to -2 S.D.	Normal	Normal	Normal
< -2 SD to -3 S.D.	Moderate Stunted	Moderate Underweight	Moderate Wasted
< -3 S.D.	Severely Stunted	Severely Underweight	Severely Wasted

Source: World Health Organization Standard, 2005

Results and Discussion

This part comprises some segments. The first three segments describe the respondents' socioeconomic, demographic and birth characteristics. The fourth segment depicts the present nutritional state of 0-6 years old children in the study area, and the last segment depicts the association between anthropometric measurements and respondents' characteristics.

Socio-demographic and economic characteristics of respondents

Among 100 mothers, 39% belong to less than 25 years of age, 33% are in the 25-29 years age group, 22% belong to the 30-34 years of age group, and the remaining 6% are under above 35 years of age (Table 3). The mean age of mothers is 26.28 years \pm SD 4.55 (Table 4). In the matter of religion,

there are 52% Muslim, 44% Hindu and 4% Christian population in the study area. On the other hand, 64% of respondents belong to the General category, 28% are to the S.C. category, and 8% to the O.B.C. category. Parents' education level is divided into four subgroups, namely primary level, middle school level, high school and above level of education and illiterate. Table 3 shows that 70% of mothers have a middle school level, 13% have a high school and above the level of education, and 8% belong to the primary level. It is also observed that 9% of the mothers do not have any education. Apart from this, 24% of fathers have primary, 52% have middle school level, and 15% have high school and above the level of education. Also, 9% of illiteracy is present among fathers (Table 3).

Table 3: Percentage-wise distribution of socio-demographic characteristics of respondents

Factors	Category	Percentage
Age group of mothers	<25	39
	25-29	33
	30-34	22
	35-39	6
	>40	0
Religion	Hindu	44
	Muslim	52
	Christian	4
Caste	General	64
	S.C.	28
	O.B.C.	8
Mother's education	Primary Level	8
	Middle school Level	70
	High School and Above the H.S. level of education	13
	Illiterates	9
Father's education	Primary Level	24
	Middle school Level	52
	High School and Above the H.S. level of education	15
	Illiterates	9
Mother's occupation	Working Women	5
	Home Makers	95

Factors	Category	Percentage
Type of family	Joint	33
	Nuclear	67
	Kutchha	29
House Type	Semi-Pucca/Kutchha	31
	Pucca	40
	Tube wells	83
Source of Drinking Water	Piped water	6
	Bottled water	11

Source: Field Survey and Computed by Authors, 2021

In the study area, it turns out that most mothers are housewives to 95%, and only 5% are found to be working. Father's occupational status is divided into four sectors. Of the total 100 respondents, 55% are labourers, 20% are people in business, and 13% are cultivators and service holders, respectively. Regarding the family type, 33% of the total family is joint, and the remaining proportions are nuclear (67%). Most children belong to the nuclear family background (Table 3). The average monthly family income is Rupees 8185 \pm SD 6063.00, and C.V. is 74.04. The study revealed a higher heterogeneity in the respondents' family income. One of the striking features of the respondents is the range of their family income, i.e., Rupees 42000. The variability of respondents' occupations is one of the main reasons for the wide variation in their income levels. About 28% of the respondents have a family income of 5000 rupees or less, while the family income of 3% is more than 20,000 (Table 4).

Table 4: Descriptive statistics on socio-demographic characteristics of respondents

Category	N	Range	Mini- mum	Maxi- mum	Mean	Standard Deviation	Coefficient Of Variation
Mother's Age	100	22	17	39	26.28	4.55	17.31
Mother's Education	100	17	0	17	7.79	4.16	53.45
Father's Education	100	17	0	17	6.91	4.22	61.12
Family Income	100	42000	3000	45000	8185	6063.07	74.07
Family Expenditure	100	8500	1500	10000	5715	2282.18	39.93

Source: Field Survey and Computed by Authors, 2021

Demographic profile of children

In the study, children from 0-6 years comprise the sample population. Of 100 children, 45 are male, and 55 are female (Table 5). In the case of child age, the mean age is 38.34 months \pm SD 22.41. Among the age, height and weight of children, the coefficient of variation of age distribution is the

highest, more than 58%, which means a higher variability. The variability increases due to the selection of samples from one month to 72 months of children. In the matter of siblings, the CV is more than 100. Therefore, the variability or heterogeneity is much higher in this factor. Because some of them do not have any siblings, and some have more than four siblings (Table 6).

Table 5: Percentage-wise distribution of demographic characteristics of children

Factors	Category	Percentage
Sex of the child	Male	45
	Female	55
Age group of the children (month)	0-19	30
	20-39	15
	40-59	32
	>60	23
	0	50
No. of siblings	1-2	30
	>2	20
	0-49	1
Present height of the children(cm)	50-100	76
	>100	23
	0-10	32
Present weight of the children (kg)	10-20	62
	>20	6

Source: Field Survey and Computed by Authors, 2021

Table 6: Descriptive statistics on demographic characteristics of children

Category	N	Range	Mini-mum	Maxi-mum	Mean	Standard Deviation	Coefficient Of Variation
Present age of Children(month)	100	71	01	72	38.34	22.41	58.45
Height(cm)	100	79	46	125	86.73	17.58	20.26
Weight(kg)	100	22.7	02	24.7	12.23	4.28	34.91
No. of Siblings	100	4	0	4	01	1.02	100.46

Source: Field Survey and Computed by Authors, 2021

Birth characteristics of children

Out of the total children (100), 50% have first order of birth. It is also clear that 30% of children have birth order two, and only 10% have birth order three and above. The average birth weight of the children is 2.88 kg. Out of the total sample, about 65 babies had a birth weight of 2-

3kgs, 31 had a birth weight above 3 kg, and only 4% had less than 2 kg. Due to the availability of free services in governmental hospitals, most rural women choose hospitals for childbirth. In the study area, 88% of women delivered their babies at Baruipur Sub-divisional Hospital.

On the other hand, 6% each had a home and nursing home deliveries. Normal delivery (73%) is also more common than cesarean (27%). Regarding breastfeeding status, 88% of the infants have taken breast milk as their primary food, although 12% could not have this opportunity due to various maternal problems. (Table 7)

Table 7: Percentage-wise distribution of birth characteristics of children

Category	Category	Percentage
Birth order of the children	01	50
	02	30
	>2	20
Birth weight of the children(kg)	<2	4
	2-3	65
	>3	31
Term of delivery	Normal	73
	Cesarean	27
Place of birth	Hospital	88
	Nursing Home	6
	Home	6
Breastfeeding status	Yes	88
	No	12

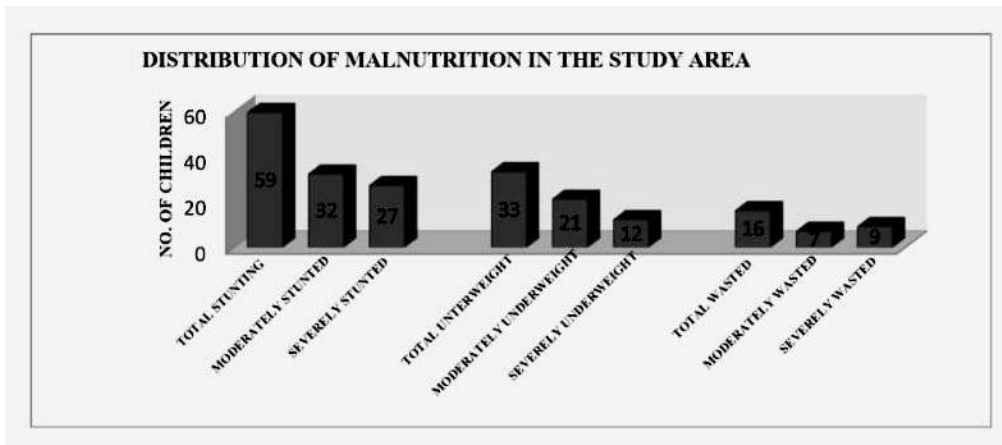
Source: Field Survey and Computed by Authors, 2021

Nutritional status of children in the study area

Malnutrition is either undernutrition or overnutrition. Undernutrition usually combines stunting, wasting, being underweight, and inadequate micronutrients. Conversely, overnutrition means obesity and overweight. With the help of anthropometric measurements, it is easy to know whether children's growth is going well. The most well-known and widely used anthropometric measurements are stunting, wasting and underweight. When the child's height is shorter than his/her age is considered stunting. On the other hand, if a child's weight is not coherent with his age is known

as underweight. Similarly, wasting refers to low weight for height. The WHO standard reference has been determined to measure these issues (Table 2). Among 100 under-six children (45 boys and 55 girls) selected in this study, 59% (59) were stunted. Of the total stunted, 54% (32) are moderate, and 46% (27) are severe malnutrition. Regarding underweight, 33% of the total sample children were underweight, of which 64% (21) are moderate, and 36% (12) are severely underweight. In the same way, out of the total child population, 16% (16) were wasted, 44% (07) belonged to the moderate category, and the rest, 56% (09), were in the severe category of wasting. In that case, it is easy to say that the nutritional status condition is unsatisfactory. A significant proportion of children suffer from malnutrition (Figure 2).

Figure 2: Distribution of malnutrition in Baruipur Block



Source: Computed by Authors, 2021

The association between anthropometric measurements and respondent’s characteristics

The effects of malnutrition are multifaceted. The nutrition status of children under five years of age is influenced by various factors (Ansuya et al., 2018, p. 5). Table 8 shows the association between nutrition status and the socio-demographic characteristics of respondents. The chi-square method was used to show this association. This study revealed that religion, parents' educational status, house type, breastfeeding status, term of delivery, and birth interval are important factors affecting a child's nutrition status.

In the matter of stunting, it has a significant association with religion, breastfeeding status and colostrum given to children at 0.05 and 0.01 levels of significance. If we look at the religion-wise distribution, we see that the number of stunted children is the highest, almost 67% in the Muslim community and about 48% of stunted children in Hindu communities. The present study reveals that the number of children deprived of breast milk is higher in the Muslim community. Of the total deprived children, 75% belong to the Muslim community. Awareness of child health among mothers is also low due to the high illiteracy and primarily educated parents. As a result, the number of malnourished children is higher in this community. Breastfeeding status is also significantly associated with stunting at a 99 % significance level. Breast milk is an essential element in child growth. The duration of breastfeeding greatly influences stunting (Kikafunda et al., 1998, p. 5). That is why breastfeeding status is one of the most important factors in determining the nutritional level of infants and children. It is found that the rate of stunting is highest among the children who are deprived of breast milk, found to be 83%.

On the other hand, children who get this opportunity are less prone to stunting. This result is similar to the studies from Bangladesh (Fuchs et al., 2014, p. 3), Uganda (Kikafunda et al., 1998, p. 5), India (Mishra et al., 2013, p. 3), Nepal (Pravana et al., 2017, p. 5) etc. Colostrum given to children is also significantly associated with stunting ($p < 0.05$). The current study reveals that the stunting rate is comparatively higher in children deprived of colostrum at birth (77%). On the other hand, this tendency (stunting) is somewhat lower in children who have received colostrum properly at the right time. The concept of colostrum is unclear to most mothers in the study area, and many deprived their children of it as it is considered harmful to the baby.

Usually, wasting means low weight for height. It is a major sub-group of malnutrition. It is seen that (Table 8) there is a statistically significant association of wasting with various socio-demographic indicators, such as the educational status of parents, term of delivery, house type, mother's age of marriage and birth interval. It can be seen that the number of wasted children is comparatively higher in the Hindu community. Adequate parental education is an important regulator in determining child health. The present study revealed that maternal literacy has a statistically significant association with wasting at a 0.05 level of significance. The prevalence of wasting is relatively low in children whose parents are both educated.

On the other hand, this tendency is more noticeable in children whose one parent is literate or both are uneducated. The current study reveals that the proportion of wasting is the highest among illiterate mothers, at 44%. On the other hand, mothers who belong to high school and above educational level do not have wasted children at all. Father's education is also statistically associated with wasting ($p = < 0.01$). Usually, the father is the main earning member and decision maker. As a result, the father's education is the most important key to the development of the whole family, and similarly, their level of education helps to ensure the proper health and nutritional status of children (Nahar et al., 2010, p. 479).

Table 8: Association between anthropometric measurements and respondents' characteristics

Influential factors	Category	% of stunting	'P' Value	% of wasting	'P' value	% of underweight	'P' value
Religion	Muslim	67.3	0.012	13.46	0.037	40.38	0.507
	Hindu	47.7		18.2		22.72	
	General	64.06		14.06		35.93	
Caste	S.C.	50	0.088	21.42	0.727	25	0.868
	O.B.C.	50		12.5		37.5	
	Primary	62.5		12.5		12.5	
Mother's educational status	Middle school	59	0.359	15.71	0.003	35.71	0.244
	High school & above	69		00		15.4	
	Illiterate	44.4		44.4		55.55	
	Primary	67		17		37.5	
Father's educational status	Middle school	54	0.742	13.46	0.007	33	0.092
	High school & above	60		6.66		13	
	Illiterate	67		44.44		56	
Mother's occupation	Working women	80	0.354	20	0.734	80	0.979

Influential factors	Category	% of stunting	'P' Value	% of wasting	'P' value	% of underweight	'P' value
Type of family	Homemakers	58	0.265	16	0.799	31	0.091
	Joint	52		15		39	
	Nuclear	63		16		30	
House type	Kutchra	59	0.479	21	0.071	52	0.011
	Semi-pucca	59		16.12		16.12	
	Pucca	42		12.5		32.5	
Source of drinking water	Tube well	57	0.939	17	0.432	32.5	0.887
	Bottled water	67		17		33.33	
	Piped water	73		09		36.36	
Treating water before drinking	Yes	54	0.222	08	0.355	19.23	0.072
	No	61		19		38	
Family Income	<10,000	61.42	0.200	17	0.532	33	0.357
	10,000-20,000	50		14		36	
	>20,000	100		00		00	
Mother's age of marriage	<18	67	0.439	20.89	0.016	41	0.262
	>18	44		6.06		17.64	
Age of childbirth	<20	62	0.484	21	0.397	55	0.421
	>20	58		14		24	
Place of birth	Hospital	57	0.661	16	0.178	33	0.532
	Nursing home	83		33		33	
	Home	67		00		33	
Term of delivery	Normal	62	0.671	20.54	0.005	42.5	0.005
	Cesarean	52		04		07.40	
Breastfeeding status	Yes	55	0.000	100	0.285	34	0.641
	No	91		00		27	
Sex of the child	Male	62	0.738	24	0.104	33	0.565
	Female	56		09		33	
Birth Interval	<2	65	0.433	8	0.040	31.25	0.462
	2-4	50		22		39	
	>4	56		24		32	
Colostrums Given	Yes	54	0.044	17	0.442	31	0.432
	No	77		14		41	

Source: Field survey and computed by authors, 2021

The present study reveals that the number of wasted children is the highest among illiterate and primarily educated fathers, almost 44% and 17%, respectively. The number of wasted children is the lowest among fathers with higher educational qualifications. The same finding has been found in many other studies (Ansuya et al. 2018, p. 5; Nahar et al. 2010, p. 479). The significant relationship between the child's nutritional status and the mother's marriage age has also been noticed here ($p=$

0.016). It was found that women 18 or younger at the time of marriage had more wasting in their children than those who were married over 18. The reason behind that is that, due to getting married at an early age, most of them were also under the age of 20 to give birth to their first child, and they also have, on average more than two children. Due to the number of children and their financial instability, they are also prone to malnutrition. It has also been shown that wasting is more prevalent in children with normal delivery (about 21%) than in caesarian (only 4%). Many other studies have seen a significant association between birth interval and children's nutritional status (Pravana et al., 2017, p. 5; Rahman et al., 2016, p.10). The present study shows that the relationship between wasting and birth interval is proportional, i.e., the number of wasting increases as the birth interval increases. For example, in this case, the amount of wasting is the highest in children with a birth interval of more than four years (24%).

Children with low weight-for-age are known as underweight. In the case of underweight, it has been seen that house type and term of delivery significantly affect children underweight. House type is an important social determinant of children's underweight (Ramalho et al., 2016, p. 05; Senthilkumar et al., 2018, p. 2843). Here it turns out that, out of 29 respondents living in Kutcha houses, 15 children (52%) belong to the underweight category of malnutrition. This amount is comparatively less among the children living in Semi-Pucca and Pucca houses. Victora et al. (1986) described in their study that house type strongly correlated with stunting and being underweight. According to them, children living in semi-pucca or pucca houses are less likely to be underweight; conversely, it is more common in children living in shacks. Another important determinant factor of malnutrition is the term delivery. According to surveyed data, 43% of total normal delivery babies and 4% of total cesarean children are underweight.

Conclusion

In developing countries like India, child malnutrition is an egregious issue. According to NFHS reports, the graph of this issue in India is declining, although child malnutrition is still one of the most important causes of the social backwardness of our country. This problem is very evident in terms of regional differences. It can be seen that this problem is comparatively more prevalent among rural children.

This present study has been completed to determine the nutritional status of children and infants aged 0-6 years in rural areas of the Baruipur block. The study revealed that more than half of children are stunted (59%), 36% are underweight, and 22% belong to the wasted category of malnutrition. The stunting rate of children in this region is much higher than in India (36%), West Bengal (34%), and South 24 Parganas (37%). On the other hand, the underweight rate of children is less than 1% higher than in India (32.2%), West Bengal (32.2%), and South 24 Parganas (32.2%). In contrast, the rate of wasting in the study area is much lower than in India (19.3%), the state (20.3%), and the district (21.2%). Overall, the nutritional condition of children is not at all satisfactory condition. A major part of them is suffering from malnutrition. This study also revealed that the educational status of parents, house type, term of delivery, breastfeeding status etc., are the important influencers on children's nutritional status.

In order to reduce the risk of malnutrition in children aged 0-6, the following issues can be emphasised: increase health education or nutritional knowledge among the parents through various training, mothers need to be made aware of the benefits of colostrum and breast milk through various awareness programs, ensuring the availability of nutritious supplementary foods to the children, monitor child growth periodically, take appropriate child health measures, improve sanitation facility and personal hygiene practice. In the end, it can be said that the development of child health infrastructure and people's awareness will be able to solve this problem in developing countries forever.

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From Lockdown to Loneliness: The Plight of Elderly People in South Kolkata of Kolkata Municipal Corporation, West Bengal

Sramana Maiti¹ and Shovan Ghosh

Abstract: The process of ageing is a universal and inevitable phenomenon. Moreover, the individual aged person in this world can suffer from different issues like health-related, demographic, economic and social, psychological issues etc. Against these backdrops, the present paper opts to scrutinise the multifaceted behavioural and social issues of elderly people in this present critical juncture of the Covid 19 pandemic and subsequent lockdown effect. Based on simple random and snowball sampling, 100 elderly people were surveyed from different pockets of Kolkata Municipal Corporation (KMC), West Bengal. The samples were selected from various social domains, including those living in complexes, semi-complexes, standalone apartments, ancestral homes, middle-class residential zones, etc., to unfold the dynamicity of elders' loneliness upon the impact of covid 19 pandemic and subsequent lockdown effect. With the help of the UCLA score, elders' loneliness or isolated situation during Covid-19 has been uncovered. The present study revealed that the covid 19 pandemic and the lockdown effect have tremendously augmented the elders' loneliness and enhanced their socio-psychological problems.

Keywords: Ageing, Elder generation, Covid-19 Pandemic lockdown, Loneliness, Family pattern, Gender disparity

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Introduction

The older generation of our society is the inevitable consequence of population ageing. The World Health Organization (WHO) has observed that between 2015 and 2050, the global population of over 60 years will approximately double from 12 to 22 per cent and thereby, senior people will outnumber the proportion of children. In the case of India, the segment of the older population was 91.6 million in 2010, but the projected proportion of the elderly population will hike to 158.7 million in 2025 (DESA-UN Report, 2008). West Bengal will also experience the same soon. According to the technical group of Population Projections, National Commissions on Populations, the state will experience a considerable rise of 60+ population comparing the total population over the next few years. It has been projected that there will be a rise of 26% of the total population in 2026 compared to the base year of 2001, whereas 60 years above population will rise to 170 % at the same time (BKPAI-UNFPA Report, 2014). Another level down, Kolkata Municipal Corporation (KMC) is already considered ageing city as the proportion of aged people is much higher than in any other metro city (Times of India, 2015). The article, published in the Times of India (2015), reveals that Kolkata holds a proportion of 11.76% of the elderly population, whereas Chennai, Mumbai, and Delhi consist of 9.9%, 8.9% and 7.8% of the elderly population, respectively.

¹ Corresponding Author.

The sophisticated medical treatments and improved lifestyles allow people to live longer and lead to escalating population ageing much faster than in the past. Longevity allows human beings to enjoy the world for more time, but it also invites several social, economic, and other issues. Mane (2016) has highlighted several issues of the elderly generation in the Indian context. According to him, the emerging social problems for senior people are the lack of proper infrastructure, change in family structure, lack of social support and social inequality, health issues, etc. Amiri (2018), on the other hand, has tried to explain the problems of an ageing population concerning Indian traditions. With the changing time, older people are becoming inactive, dependent, sick and weak economically, physically and psychologically, which leads to several social and economic problems. Most of the above-referenced social problems are supposed to be interfered with by the Government to some extent, but the Government cannot modify the changing family space or living arrangements, instead is a process of society. In India, a rich family structure is a prominent societal character. Earlier, the joint family pattern was a conventional family structure. This family structure helps the member become mentally, physically and psychologically strong. In a post-modernisation era, Indian society faces a trend of disintegration of the joint family pattern. The disintegration does not mean that people are rejecting traditional culture, but the circumstances and conditions are responsible for this (Times of India, 2020). So it is an urgent need to study the impact of this change on older people in society. This paper also aims to concentrate on the issues of the older generation of our society to study the behavioural pattern and influence of present living arrangements on them. Another dimension will be added to this study as the Covid-19 pandemic outbreak has occurred worldwide. The lockdown and quarantine period has a significant impact on everyone's lifestyle. The older generation is not excluded from everyone, and it is pretty evident that the age group above 60 years who have been affected differently. Grolli et al. (2020) have stressed older people's psychiatric and neurological problems due to the Covid-19 pandemic. The authors have highlighted the issues that older people in our society have a silent fear feeling, and those already suffering from mental vulnerability are exposed to this feeling. Pant and Subedi (2020) have discussed the impact of the Covid-19 pandemic on the older generation from several perspectives, like social isolation, financial hardships, maintaining dignity during the pandemic, etc.

Against this background, the present paper is a submission to explain the problem of elderly people in general and during the covid-19 pandemic, particularly the subsequent lockdown phase. The paper has been broadly divided into four sub-sections. The first section provides a glimpse of the socio-demographic profile of the respondents. The issues of elderly people, in general, are the domain of the second section, while the third section explores the issues of elderly people in the Covid-19 lockdown phase. Finally, the fourth section concludes the paper.

Literature Review

Kumar (2011) stated that 18.7% of seniors in 2006 stayed alone or with a spouse, while only 9.0% in 1992. The paper has highlighted the issues and provided solutions to some extent in the form of ongoing government policies in several sectors for older people. The authors have suggested a need to build intergenerational bonding focusing on reciprocity.

Venn et al. (2011) have highlighted the gendered dimension of ageing populations. The authors have opted to study the ageing population while discussing both the male and female perspectives. The paper opted for a theoretical approach to studying older people and evaluated how the gender perspective has been neglected. The authors have also highlighted that the living conditions of elders may differ with the status of a partnership and a gender bias issue.

Jadhav et al. (2013) have attracted attention to the living arrangements of the elderly in India among the BKBPPI surveyed states. The total surveyed sample in seven states is 9852. The gender dichotomy has revealed that a higher proportion of older women live alone than older men. The

reasons identified by the authors are either not having children or children living elsewhere because of migration or marriage. The dominant type of living arrangements are widowed older women with no education and who never worked, who seem to live with children and grandkids. On the other hand, 15% of widowed women and men have reported that they live alone.

The challenges and issues of the ageing population in the Indian context have been explained by Devi (2019). The highlighted issues for older generations are lack of infrastructure, changing family structure, lack of social support, elder abuse, and social protection. When speaking about changing family structure and lack of social support, the author asserted that the emerging prevalence of nuclear families leads to exposure to emotional, physical and financial insecurity.

Banerjee (2020) highlighted that senior people are more susceptible to mental health problems related to such pandemics, leading to exceptional care for geriatric mental health during this crisis. Regarding mental health during pandemics, health anxiety, panic, adjustment disorders, depression, chronic stress and insomnia are the significant offshoots. In addition, social distancing, through a major strategy to fight COVID-19, is also a major cause of loneliness, particularly in settings like nursing care or old-age homes, which is an independent risk factor for depression, anxiety disorders and suicide.

The global pandemic is going on. De Pue(2021) has attempted to identify the impact of the covid-19 pandemic on older adults' well-being and cognitive functions. Based on surveys, the authors concluded that COVID-19 significantly impacted older adults. It has been observed that there was a significant decrease in well-being, activity level, and sleep quality during the COVID-19 period as compared to before COVID-19.

Objectives

The objectives of our study are as follows:

- a. To chalk out the behavioural and social issues of the older generation of our society and the relations between them;
- b. To find out how far the elders get affected by the Covid-19 Pandemic and whether it has augmented their loneliness upon the lockdown.

Research Questions

The research questions of the present study are as follows:

- a. What are the social and psychological issues of the elder population living in Kolkata Municipal Corporation?
- b. Is there any gender difference regarding the socio-psychological issues of elders?
- c. Whether the Covid-19 Pandemic lockdown accentuated the loneliness of the elderly?

Data Sources and Methodology

The research work is based on a suitable methodological approach with types of observation, records, literature and their critical analysis to perceive the absolute as well as relative dimensions of the work. The study is empirical and analytical. The target group of the study was people above 60 years of chronological age, selected mainly from the Kolkata Municipal Area (KMC) in general and the South Kolkata region in particular through the Random Sampling and Snowball Sampling Method. The total sample size of the present study is 100 has been selected from a middle-class residential zone. The sample is selected to research the old age population of various categories, such as those residing in apartments, or their

Table 1: Detailed account of sampling

Area	Total number of respondents	Sampling Method		Way of collecting data
		Simple random sampling	Snowball sampling	
		Number of Respondents		
Behala	30	26	4	Telephonic Interview, Google Form of Questionnaire Distribution, Questionnaire Survey.
Thakurpukur-Joka Area under KMC	32	18	14	
Tollygaunj	24	18	6	
Baguiati	5	1	4	
Bhowanipur	9	8	1	

Source: Field Survey, 2021

ancestor's houses etc. In a nutshell, the respondents have been selected from a middle-class residential zone. In this case, simple and sophisticated quantitative statistical techniques that are considered useful in this work have been adopted to find out the issues of the elderly generation and the loneliness of elders during the Covid-19 Lockdown period. Various statistical techniques such as the Chi-Square test, t-Test and descriptive statistics have been used to unfold the gravity of the problem. To unveil the different dimensions of issues of the elderly population, the Chi-Square Test has been done on a sample of 100 respondents using SPSS software (Version 26.0).

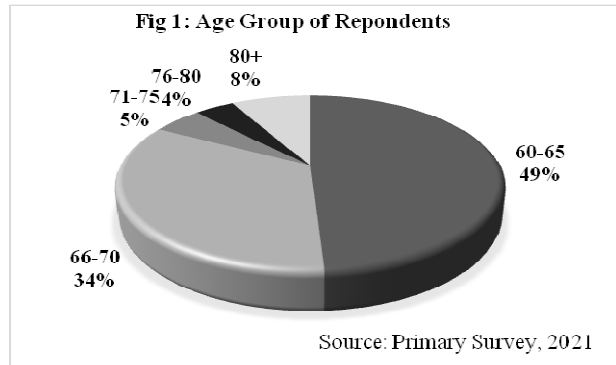
Likewise, to test the association between the loneliness of elderly generations before COVID-19 and after the COVID-19 Pandemic, purposive sampling has been adopted for convenience on 42 respondents. Again, the UCLA (University of California, Los Angeles) loneliness scale (Version 3) has been applied. These 42 samples have been selected among the 100 respondents based on the average UCLA scale of loneliness score.

Socio-demographic profile of the respondents

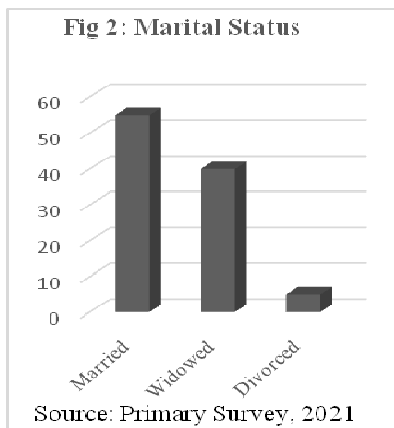
In order to have an analysis of the impact of Covid-19 and the subsequent lockdown effect, first of all, the socio-demographic profile of the respondents needs to be explored.

To have an analysis of the impact of Covid-19 and the subsequent lockdown effect, first, the socio-demographic profile of the respondents needs to be explored.

Ageing Pattern: The respondents' ageing pattern (Fig:1) is quite diverse. Nearly half of the respondents belong to the 60-65 age group. This age group is pretty interesting as they are recognised as senior citizens in society and have entered another phase of their life. The probable dichotomy would be more visible if respondents belonged to economically productive units. The next major (34%) age group of respondents was 66-70. This age group have experienced old age for some years, and the perspective will be slightly different from the previous. The other age groups are 71-75(5%), 76-80(4%), and 80+ (8%) aged people, which share the rest of the percentage.



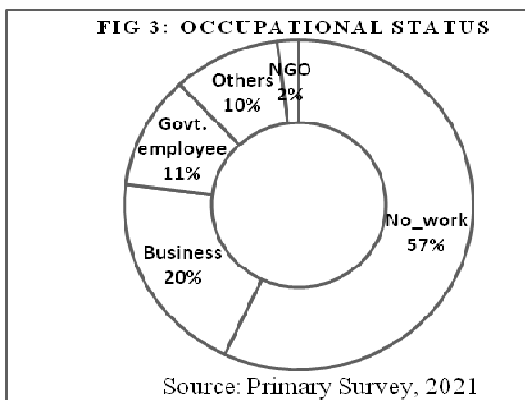
Marital Status: Most respondents (Fig:2) are lucky enough to be with their spouses, while some are not. Around 55% of people are married, while nearly 40% are widowed among the total sample. Though divorce is uncommon among aged people, a very small proportion (5%) is divorced. No respondents were unmarried.



Educational Status: Nearly one-fourth of the respondents have graduated. The next major education level of respondents are the Matric level and Higher Secondary level. Finally, the Post-Graduation level is obtained by 17% of respondents.

Occupational Status: It has been revealed from the primary survey (Fig:3) that as senior citizens, most of the respondents are now retired or have been full-time homemakers all along. Naturally, the percentage of no-work groups gets a larger share (57%). However, it is a good sign that 43% of respondents are connected with direct economic activity, including business or government sectors and Non-Governmental Organisations (NGOs).

Family Pattern: From a very objective point of view, the proportion of joint family residents (23%) is significantly low comparing nuclear family residents (57%). The family structure plays a vital role for older populations. In Indian culture, a family does not mean a single household. Sometimes, multiple households may belong to one family. For them, the family does not mean separate households all the time but a feeling by which, despite having separate households, they can be considered one family (Shah, 1999). In old age, people try to coexist with their family members and enjoy the company of grandchildren, cousins, sons and daughters or other family members. For that, the family pattern and the number of family members also play a major role. The picture is clear from the family pattern of the respondents as the proportion of



joint families is relatively lower than the nuclear family. Nearly 77% of respondents have family members of less than 5, whereas 23% live in a comparatively large family with members of more than five people.

Family Income Status:The family income may reveal the living conditions of the elders. The study shows that around 47% of the total sample belongs to the higher-income group, whereas a very low percentage (10%) belongs to the relatively lower-income group.

The characteristics of the sample (Table 2) can be suitably captured using descriptive statistics. Here, the attention goes to specific variables bearing higher Coefficient of Variation values. First, the educational status of the respondents is highly deviated from the mean value (3.14), having an SD value of 1.86. This means that most of the respondents have a graduation degree, but the CV value (59.19) says that some respondents have a different level of education like Matric, Higher, Secondary and Post-graduation. In addition, some respondents have vocational training. The next variable which seems to be important is the no. of family members. The mean value (4.22) represents that most of the respondent's families were nuclear families having four members or fewer. Though the CV (59.20) is not high enough, there is also some variability among family members. From the observations, 80% of the nuclear family reside, and the rest reside in a joint family. Finally, considering the pandemic situation, the variable whether the routine has changed or not, the mean value (1.67) says that indeed there is a change in the routine of elders, though there is a small deviation (0.79); CV value (47.43) is quite variable. In our society, the older generation is the retired section, mainly away from economic activity, though there are exceptions. However, as 57% of respondents in our sample are categorised under the 'no work' category, it is clear that they are already confined to their houses. Thus, it explains that after the Covid-19 lockdown, the respondents were divided into two halves of opposite responses; i.e., most of them agree that the routine has changed, but the other half do not think there is a change.

Table 2: Descriptive statistics

	Mean	Std. Deviation		Skewness
	Statistic	Statistic	CV	Statistic
Age	67.46	7.56309	11.21122	1.854
Education	3.14	1.85875	59.19586	0.986
Marital_stat	2.86	0.97463	34.07797	0.287
Family_type	1.75	0.43519	24.868	-1.172
Family_mem	4.22	2.09173	49.56706	1.431
Income	2.69	1.02193	37.98996	-0.211
Work_b4_60	1.46	0.53973	36.96781	0.555
Grandchild	1.67	0.68246	40.86587	0.527
routinechnng_after pan	1.67	0.79207	47.42934	1.661
UCLA_Norm	46.92	7.84661	16.72338	0.151
UCLA_Pan	47.68	8.31438	17.43788	0.372

Source: Computed by the Authors, 2021

Issues of Elder Generation

In a rapidly changing world, senior people may find themselves isolated from society and thus leading to different kinds of issues. The inability to cope with changing values and lifestyles, social isolation, and social adjustment are some of the social issues of the older generation in our society. A generation gap or intergenerational conflict is another rising issue for elders, ultimately leading to the former. These social issues also cause psychological complexities like depression, anxiety, lack of purpose, and loneliness. In addition, the changing family pattern and family values can enhance the problem.

In this section of our study, these broad social issues have been discussed at a minor level. The observations are aimed to unveil the different issues of the elderly, like what kind of dimensions are there in case of living arrangements etc. The elders of our society have some particular needs. Proper housing, along with favourable living arrangements, is one of them. The increasing old-age population needs urgent care and support, especially from family members.

On the other hand, an insufficient public pension and social security system is holding back planning for the elderly regarding living arrangements. (Jadhav et al., 2013). Added to this, the changing family structure is also playing a significant role. In this section, Chi-squares (table 3) on some particular variables can help us to understand the situation. The test has been taken from a gender and family-type perspective.

Table 3: Living arrangements of elders and relationship with different variables

Influenced variable	Influencing variable	Chi-square value	Significance level
Willing to go to Old Age home	Gender	6.570	P >0.05
Willing to go to Old Age home	Family Type	18.690	P <0.05
Missing Joint Family pattern	Gender	25.587	P < 0.05
Missing Joint Family pattern	Family Type	15.090	P < 0.05
Cope up with a grandchild	Gender	9.140	P <0.05

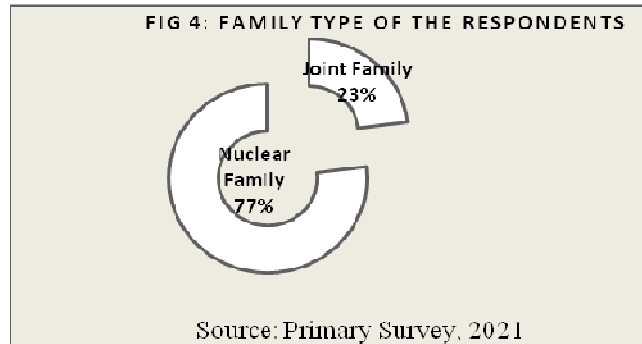
Source: Computed by the authors, 2021

Concerning the relationship between the willingness to go to an old age home and gender, the respondents were asked if they agreed with the statement that an old age home can provide them with a tension-free life. Around 48% of male respondents strongly disagreed with the statement, whereas nearly 20% of male and 31% of female respondents seemed undecided. Interestingly, a small percentage of males and females, 8% and 10.7%, respectively, strongly agreed with the statement. However, the perspective completely changed as and when the family type came into the picture. Having a significant value ($p < 0.05$), it is clear that the difference in family patterns and the willingness to go to old age homes can differ. Here, Joint Family and Nuclear Family are the two main family types. Three among five respondents belonging to a joint family have shown their unwillingness to be at the old age home.

On the contrary, around 23% of people from nuclear families agreed that an old age home could provide them with a tension-free life. This is because the joint family members are used to living together, and this acts as a support system for all the age groups. On the contrary, elders from nuclear families find themselves lonely at the end of the day and seek an opportunity to live together. In this situation, an old age home or community home can provide them with a safe feeling. In an

article in *The Hindu*, Vidya Venkat (2017) has provided that the breakdown of the joint family can be considered one of the key reasons today's elderly are on their own. The larger family always acts as a support system for aged people, but changes in sociological patterns have taken that away.

In Orient culture, the family pattern acts as an influential factor on elders. Here, the study has been done on gender and family type. From the cross-tabulation, the female respondents are more prone to miss the joint family pattern, but most male respondents seem undecided about it. From the family type viewpoint, the nuclear family members naturally miss the joint family pattern the most. Kumar (1999) has already stated that the institutional concept of family in Indian society is a joint family system. Considering nostalgia, people are naturally sensitive to joint family patterns. In developed countries, older people will likely stay alone and depend on themselves. Comparing the condition of developed countries with developing countries like India, we may observe a different picture. Hugo and Williamson (2011) discussed in their 'Global Ageing' article that the older generation in developing countries relies on their family members for survival and well-being. Most adult people are likely to stay with their children and family. They want to see their descendants daily, which interprets our observation very precisely. Most of the respondents live in a nuclear family. They are confined in that familiar place and do not want to go to another place by easily giving up their comfort zone.



Last but not least, it is vital to study intergenerational relationships. Between grandparents and grandchildren, about one-fourth of male Respondents and one-fifth of female respondents agreed that they could cope with their grandchildren. On the other hand, around 35% of female respondents cannot understand their grandchildren that much, against 8% of male respondents. The observations gradually reveal that elderly people in our society are quite family-oriented. Once when the joint family system was ubiquitous in society, the older generation was surrounded by the next generations. Filial responsibilities were socially common and considered a duty for the younger generation. Older adults who need assistance to remain at home can only be possible by relying on others.

In the contemporary scenario, the traditional family pattern, i.e. the extended and joint family system, is changing due to factors such as intra-migration, inter-migration and transnational flow, the decline in fertility, and an increase in life expectancy. Earlier, the grandparents usually died before their grandchildren reached adulthood. This could be explained through an upright pyramid, where children are at its base and grandparents are at the apex. However, the family pattern started to change at the beginning of the '80s and '90s. Nowadays, the dominant family structure can be explained through an inverted pyramid where children are at the peak and great-grandparents, or grandparents are at the base. In addition, the fertility pattern and social concerns have changed the number of family members. The changing family pattern and the change in family members lead to the evolution of living arrangements. Sreerupa et al. (2018) explain living arrangements in terms of the type of family in which the elderly live, the headship they enjoy, the place they enjoy or the place they stay in and the people with whom they stay.

In other words, the term living arrangement refers to one's household structure (Palloni, 2000). The 2011 census data uncovered that the number of households had increased substantially in the last decade, and the number of persons per household has decreased. This phenomenon can be explained

by the combination of declining fertility, migration, and nuclearisation of families are three probable reasons for such reduction. Talking about introducing the nuclear family, an article in the Hindustan Times (2011) reported that it ultimately leads to a lonely life for elders, which may harm their emotional and physical well-being. A survey conducted by Agewell Foundation has found out that 60.54% of interviewed older persons were found living alone or residing in nuclear families.

Interestingly, about 45% of respondents said they would like to live in a joint family, but their circumstances do not allow them to do so. A similar situation has been portrayed in our study. The maximum number of respondents (Fig: 4) are from the nuclear family (77%) and have less than five family members. From our observation, it can be said that about 66.7% of female misses the joint family pattern immensely, whereas 20% of male elders miss the joint family system. Moreover, 41% of respondents from our sample expressed an intense disappointment regarding their present family type, i.e. the nuclear family and concluded that they miss the joint family pattern. Cost of living efficiency and mental and physical support is the main reason for missing the joint family pattern.

Banking and device operations: This section of the study (table 4) has highlighted the issues of the elder generation related to exposure to the outer world. First, consider handling banking inquiries efficiently in light of the gender dimension. It is shown here that the relationship between gender and the operation of banking facilities is significant, i.e. gender can influence the efficiency of banking facility operation. Considering the cross-tabulation of the variables, we can see that 55.6% of male respondents strongly agreed that they usually operate their banking activities, whereas only 20% of female respondents strongly agreed to do the same.

Table 4: Operation of banking enquiries, devices and elder people

Influenced variable	Influencing variable	Chi-square value	Significance level
Operating Banking Enquiries	Gender	24.946	P<0.05
Device Handle	Gender	50.573	P <0.05

Source: Computed by Researcher, 2021

The discussion should be started with a fundamental question. Can all the citizens of India, irrespective of gender and age, access the banking facility? The answer is complicated. Why? The work of Pallavi Chavan (2008) has shown that there is prevailing gender inequality in banking services. The article is based on the data from 2006 though it is still relevant for our study. In this article, the number of bank deposits per 10000 population in rural and urban areas by gender (table 5) has been provided as follows:

Table 5: Number of bank deposits per 10000 population in rural and urban areas by gender (2001)

	Women	Men	All
Rural	1702	4726	3256
Urban	3338	8278	5938
Number of bank deposits per 10000 population in rural and urban areas by gender (2006)			
Rural	1535	4611	2774
Urban	3292	8703	6134

Source: RBI, Basic Statistical Returns, Various Issues, GOI (2001)

From the above table (table: 5), we can see that the disparity between male bank account holders and female bank account holders is eye-catching. Certain other indicators of access to banking services also show the extent of disparity between men and women. In 2006, the number of bank deposits per 10,000 women was less than half the number for men. For every 100 bank deposits in the name of men in the same year, there were only 35 bank deposits in the name of women. From our field investigation, there is a significant influence of gender on banking work operations. The men handle their bank accounts and all other issues by themselves. However, in the case of women, they are likely to depend on their spouse, son or daughter. In a report by Women World Banking (2019), only 77% of women have a bank account; among them, only 50% minimally handle their bank account or do not attend at all. But why so? For a long time, women were considered only homemakers and financially dependent on men. The exposure to the outer world was less than men. Ultimately, they have lacked the interest to interact with outer society. Moreover, they do not want to take responsibility for financial issues.

In the case of handling various gadgets, a dichotomy is observed too. The study reveals that male participants are more efficient in handling devices than female participants. About 32% of male respondents agreed that they handle their devices all by themselves, but on the contrary, only 2.7% of female participants use mobile phones and other gadgets without anyone's help. On the other hand, around 87% of female respondents depend on others to use the devices.

The reasons behind this dichotomy can be explained through the looking glass of the socioeconomic profile of society. At the early stage of the commercialisation of gadgets, these communicable devices (Mobile and Laptop, in this case) were considered luxury goods. Finding these gadgets in excess numbers in a middle-class family was quite unlikely. This inadequacy led to the use of gadgets by a limited user. Most of the time, the male member used the devices more frequently than female members. The reason can be explained this way; earlier, the male member was more exposed to the outer world and needed to cope with new gadgets. On the other hand, non-working women did not feel the need to own a mobile phone as it was expensive and did not have the urgency. In this case, working women and those who like to follow the trend are more interested in using mobile phones and other gadgets.

Relationship between behavioural well-being and elder generation: In this fast world, an individual's mental well-being is as important as physical and social well-being. Psychological well-being includes evaluative well-being or life satisfaction, hedonic well-being or feeling of happiness, sadness etc., and eudemonic well-being, i.e. a sense of purpose and meaning of life (Steptoe, Deaton and Stone, 2015). According to American Psychological Association, anxiety and depression among elderly adults inauspiciously affect physical health and ability to function. In this section of our study, the different sides of elderly behaviour are studied to understand their relationship.

Here, some variables are to be studied (table: 6) from a gender perspective. First comes whether the elders get enough respect from family and if they feel unwanted at home. In this case, the gender dichotomy has been explored. Regarding respecting elders, 16 % of males and nearly 13 % of females strongly opposed the statement and revealed that they do not deserve respect from their families. In comparison, around 20 % of females seem undecided, against 8% of males.

Interestingly, around one person in every ten strongly agreed that they get enough respect from family, but only 6.7% of female respondents strongly agreed. In the case of the elder's feeling about being unwanted at home, there is a gender dichotomy too. Having a significant level of 95%, the detailed study discloses that 36% of male respondents are undecided about this feeling. On the other hand, about 25% of female respondents agree that sometimes they feel unwanted at home, against 20% of male respondents. The gender difference has also been highlighted in our following variable, where they have been asked if the daily activities seem trivial or tiresome for them.

Table 6: Behavioural well-being and elder generation

Influenced variable	Influencing variable	Chi-square value	Significance level
Respected by family	Gender	14.984	P< 0.05
Feeling unwanted at Home	Gender	15.606	P <0.05
Willing to go to Old Age home	Feeling unwanted at home	56.939	P< 0.05
Working Status	Feeling the Burden of family	8.068	P >0.05
Daily activities seem trivial	Gender	10.733	P <0.05
Source: Computed by the Authors, 2021			

The male respondents are always keeping negative responses towards this. However, the women participants do agree with the statement. Around 24% of elderly women feel tired of doing their daily activities, against no percentage when their men counterparts are concerned. At the end of the study, it can be concluded that the female respondents are much more vulnerable to underlying loneliness and dissatisfaction. A test has been run between desires to go to an old age home with unwanted feelings at home. Approximately 28% of respondents have shown a lack of interest regarding this statement. They are undecided about going to the old age home. Around 10% have agreed they feel unwanted at home, so they prefer to go to an old age home. Lastly, the behaviour of elders has been studied from socioeconomic status. Having $p > 0.05$, the study unveils that if an elder is economically productive, the feeling of being burdened by family is not influenced by the former. The World Health Organization (WHO) have presented that between 2015 and 2050, the proportion of the world's older adults may double from 12% to 22%, and it is urgent to discuss the physical and psychological needs of the elders. As per the report of WHO (2017), the most common mental and physical disorders in this age group are dementia and depression. Around 3.8% of the world's elderly population is affected by anxiety disorders. Another matter of concern for elders is social isolation. In that case, Kotian et al. (2018) concluded that women are more vulnerable to being socially isolated. These factors are gender insensitivity, lack of financial independence, gender stereotypes, etc. The family system also plays a vital role, as older adults might get benefitted from a joint and extended family system for support. The disintegration of this kind of family system may increase the chance of befall social isolation (Kotian et al., 2018). Our study also echoes the almost identical situation for elders. There is a sharp distinction between women and men in the context of different well-being issues. Women elders are more susceptible to the attack of different well-being issues than men.

Elders and Covid-19 Pandemic

For a year, the people of Bengal and the world have included terms in their vocabulary like Masks, Sanitizer, Lockdown, Quarantine, Containment Zone, etc. However, the first dawn of the 20th year of the 21st Century was not the beginning of new hope but the bearer of upcoming grave news to the world. On January 27, 2020, the first confirmed Covid -19 infection was reported in Kerala, India (Andrews et al., 2020). Then, on March 17 2020, West Bengal got its first Covid-19 case. Coexisting with Covid-19, another concept has got the limelight, i.e. lockdown. This section will study the elderly population and their pandemic lockdown experience. Lockdown is declared the 'word of the year' by Collins Dictionary.

According to Merriam-Webster, the lockdown is 'an emergency measure or condition in which people are temporarily prevented from entering or leaving a restricted area or building (such as a school) during a threat of danger'. Alternatively, in other terms, a temporary condition imposed by governmental authorities (as during the outbreak of an epidemic disease) in which people are required to stay in their homes and refrain from or limit activities outside the home involving public contact (such as dining out or attending large gatherings). The lockdown has got a new dimension during covid-19. The people got confined to their houses entirely. Well, the lockdown is not new for elders. Only this situation was indifferent form and pattern. Why so? The elders of our society generally prefer to stay in their houses.

The crowded traffic system, financial independence, and living on others' support are the subtle factors identified for the lockdown before the covid period. Shankar and Hamer et al. (2016) have already attempted to draw attention to elders' social isolation and loneliness. The authors have tried to analyse the isolation and loneliness of individuals with two measures of functional status (gait Speed and difficulties in activities of daily living) in older adults. The loneliness and other issues of elders got a new dimension during the covid-19 pandemic and subsequent lockdown. De Pue (2021) has attempted to identify the impact of the covid-19 pandemic on older adults' well-being and cognitive functions. The authors have concluded that the Covid-19 period significantly impacted older adults. They observed a significant decrease in well-being, activity level, and sleep quality during the Covid-19 period compared to before the pandemic.

On the other hand, the loneliness issue also got attention. Berg-Weger and Morley (2020) have discussed the loneliness and social isolation in older adults during the covid-19 pandemic. According to the authors, the data on the impact of loneliness and social isolation indicates significant and long-term adverse outcomes for older adults. The issues got influenced by several factors, therefore, implying a change in the behavioural patterns of elderly adults.

This section will explore elders' experiences during the pandemic lockdown. Living within a closed door, different emotional issues may arise. Quarrelling is one of them. It may cause anger, frustration, depression, or any other emotional cause, but does quarrelling among elders have a new scale during the lockdown? Observation says that quarrelling got influenced by family type during the lockdown, and it hits men and women differently. It can be said from the detailed observation that people residing from joint families (84%) have lived with their families peacefully during the lockdown. On the other hand, around 40% of nuclear family members have admitted to quarrelling with family members during the lockdown. From a gender viewpoint, the disagreement rate regarding this is lower in men (56%) than in women (65.6%).

The gloomy picture of the pandemic lockdown experience of elders has been uncovered in our next section (Table 7). The respondents were asked if they found it challenging to spend their free time and felt lonely despite living with their family or else. It is not shocking that 72.2% of respondents strongly agreed with the statement. Why is it entirely predictable? The generation gap can explain the answer. There are plenty of leisure options for the younger generation to spend quality time. Even during the lockdown, the urban young was more fascinated by electronic gadgets to kill their spare time. Scrolling down social media has always been a good way to escape from the real world. But what about the elders of our society? The elders are more prone to get affected by diseases, especially by Covid-19. Therefore, they cannot go out more often during the lockdown. Besides, from our study, it has been revealed that the surveyed elders are not expert users of digital gadgets. Also, the elderly may not be interested in the virtual world (Gupta, 2020). So, entering the virtual world cannot be an option for them to spend their free time. Many elders have lost interest in nurturing their forgotten hobbies. Television and other conventional media are the only hope for them. They feel 24 hours is unnecessarily long for them. About 73% of women have admitted that spending their free time during the lockdown has been difficult.

In contrast, only 28% of men think free time is burdensome. The picture is getting clearer. From our study, we learn that there is a difference in gender regarding gadget use. Besides, they cannot go out either. The observation says that women feel more strenuous to fill their free time than men during a pandemic. It is indeed that the daily routine of elders has changed after entering the lockdown period. The observation declares that half of the women have accepted that the pandemic lockdown has changed their daily routine. However, almost 49% of elderly women contradict the opinion. From the survey, it can be said that for homemakers, the extra time of the day is not much different from the pre-Covid-19 period.

On the other hand, 68% of male elderly respondents have admitted that their daily routine has been altered. Most of our male respondents are connected with economic activity. According to them, the daily routine is affected by the pandemic lockdown.

Table 7: Behavioural patterns of elders and Covid 19 pandemic

Influenced Variable	Influencing variable	Chi-Square value	Significance level
Quarrel With Family During Lockdown	Family Type	15.540	P<0.05
Quarrel With Family During Lockdown	Gender	14.492	P< 0.05
Difficulty At Spending Free Time	Gender	39.227	P< 0.05
Free Time Difficulty	Lonely Despite Living With Family	48.852	P <0.05
Routine Change After Pandemic	Gender	19.529	P <0.05

Source: Computed by the Authors, 2021

Elder Generation and Loneliness: In this section, an attempt has been made to explain the objective, whether Covid-19 has augmented the loneliness of the elderly population consequent upon the lockdown. In order to answer this question, the UCLA Scale of Loneliness (Version 3) has been used to measure loneliness. Daniel W. Russell (1996) was the one who developed this scale. According to Russell himself, this scale has high reliability both in terms of internal consistency and test-retest reliability. Here, two paired sample t-tests have been done among the internal statements between two periods, i.e. before Covid-19 Pandemic (Normal) and After Covid-19 Pandemic (New Normal).

Table 8: Tabulated form showing paired sample t-Test between UCLA variables (N=42)

		t-test Value	Significant Level
Pair 1	in_Tune - in_tune_cov		
Pair 2	feel_alone - feel_alone_cov	-2.864	P<0.05
Pair 3	Common_people - common_people_cov	2.218	P<0.05
Pair 4	Outgoing - outgoing_cov	1.499	P>0.05
Pair 5	left_out - left_out_cov	2.726	P<0.05.
Pair 6	People_talkable - people_talkable_cov	-3.048	P<0.05

Source: Computed by Authors, 2021

The calculated table (Table8) includes some interesting facts. Coming to the first pair, whether the respondents are in tune with others. Surprisingly there is a significant change which implies that the older generation has lost the tuning during this prolonged lockdown period. The second pair is about to determine whether there is any significant change in feeling lonely between the covid-19 pandemic lockdown and before that or not. Unfortunately, the answer is yes. The elderly people do feel lonely during this lockdown. And isn't it obvious? The elderly people have been confined in their houses for so long. No friends, no neighbours, the loneliness emerged naturally.

Moving on to the next pair, the test has been done about people sharing a common thought process or not. During the lockdown, people are stuck in a one-room and have nothing much to do. Due to the psychological rush, it is expected that people may or may not get along with each other. This phenomenon has been reflected in this pair. The elderly respondents think that the people around them are no longer on the same wavelength of thought process. The following pair deals with human nature and whether s/he is outgoing. Analysing the test results shows no significant change in this case. Because this is an in-built trait of humans, those people who are outgoing, there is very little chance to change this trait. The last two pairs indicate the cause-effect relationship with each other. If there are not many people to talk to, feeling left out is quite apparent. No wonder these two variables will bear a significant value. Another paired sample t-test has been done (table:9) that will show if there is any significant relation between loneliness between the span of before covid and after a covid period. Furthermore, not so shocking, but unfortunately, the analysis revealed that the older generation gets attacked by loneliness.

Table 9: Showing paired sample t-Test of UCLA Score

	t-test value	Significance level
Before_covid – After_covid	-3.444	.001

Source: Computed by the Researcher, 2021

The COVID-19 pandemic enormously impacted older adults aged 65 years or above. The risk of social isolation and loneliness due to governmental regulations raises concerns about the mental health and cognitive functioning of this population among the mass, especially among the elderly people.

Findings and Conclusion

After analysing the various issues of elders, it can be said that the respondents do not face any significant financial crunch, and they are living in apartments or semi-complexes or their ancestral houses of upper-middle-class families. From the analysis of living arrangements, the elders are found to be pretty much family-oriented. One thing that has attracted attention is the gender disparity among all the issues. Elderly women are more prone to get affected by social isolation and loneliness than men. The study result of behavioural issues regarding gender, like family respect, feelings of being unwanted at home, difficulty spending free time during the lockdown, routine change after the pandemic, etc., will support the findings.

Apart from the gender disparity, the psychological issues during the covid-19 pandemic are another matter of concern for the elderly population of our society. The issues like whether they are in tune with others or not find everyday things around people, their outgoing nature, feelings of loneliness and being left out have been studied respect before the Covid-19 pandemic and after the Covid-19 pandemic to find out the changes. After analysing, a significant change has been detected. The analysis helps conclude that the elders are affected by loneliness after the covid-19 pandemic. The final blow of the proof of loneliness has been revealed by analysing the UCLA Score. The significant level of the score unveils that the aged people are stroked by loneliness severely during the Covid-19 pandemic lockdown.

In conclusion, it can be said that the elders' loneliness is becoming a major issue in present society. Being stigmatised as economically unproductive and dependent on others, the elders can be affected by depression and feeling left out. However, it should keep it in mind that older generations are not a burden at all. On the contrary, society and a person may get enriched by the experience of our elders. The process of ageing cannot be stopped; it is inevitable. However, what we can do is utilise this growing population age group wisely. They have served the society for so long; society can pay back by being more empathetic towards them.

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Determinants of Age of Marriage in Saiha District, Mizoram

K.C. Lamalsawmzauvauva¹ and Samuel R. Vanlalruata

Abstract:

This paper attempts to examine factors determining the age of marriage, especially early marriage in Saiha District in Mizoram. The analysis is mainly based on field surveys and a few from secondary sources like National Family Health Survey-5. Among many determining factors, the present research focuses on the role of education, rural-urban residence and poverty to the age of marriage in the Saiha district. It was found that of these three fundamental determinants, education becomes the most significant, while rural-urban residence and poverty also play an important role in the age of marriage of boys and girls in the study area. Furthermore, it is revealed that underage marriage is associated with illiteracy among boys and girls. The study shows that class 10 and below level education become the most significant pushing factor for boys and girls to marry early in the study area.

Keywords: Marriage, Age, Education, Rural-urban, Poverty

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Introduction

Marriage as a social institution has been changing throughout human history, and it gets more and more attention from demographic scholars worldwide as it profoundly impacts fertility. Marriage is the basis of social life and happens in almost all societies. It is determined by various factors like family status, education, economy, parents of the spouses, etc. It is, therefore, a momentous event reflecting the communities' socio-cultural practices and socioeconomic conditions. The age of marriage differs from one place to another based on the population policy of different countries worldwide. For example, the legal age of marriage among girls ranges from 12 years in Equatorial Guinea, 15 years in Cameroon, Kuwait and Mali, to 21 years in Egypt, Botswana and Fiji. The legal age of marriage for girls in Equatorial Guinea is 12 years, 15 years in Bahrain and 22 years in China (UNSD, 2013). The legal age of marriage in India for girls is 18 years and 21 for boys.

The mean age at first marriage in India is 24.9 years among women aged 25-49, while the median age in Mizoram is 23.5 years. India's total fertility rate (children per woman) is 2.0, while 1.9 in Mizoram (NFHS-5), below the replacement level of 2.1. The present research shows that the mean age of marriage for boys in the Saiha district is 25.16 years, while the mean age for girls is 20.88 years, with a gap of 4.28 years. Marriage before attaining the legal age is still common in the Saiha district. Of boys, 19.24% engaged in marital affairs before attaining 21 years of age, while 26.46% of girls got married before 18. It is believed that some determinants cause the age of marriage of both boys and girls in Saiha district, like various research findings in different parts of the world.

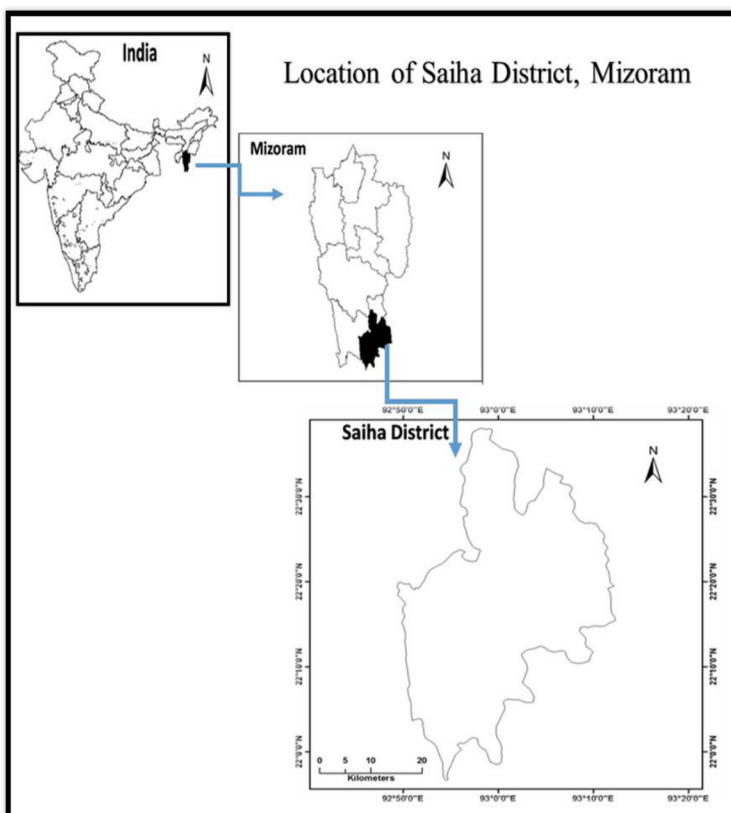
Objectives and scope of the research

The main objectives of the research are to examine the role of three important determinants, among other things, of the age of marriage like education, rural-urban residence and poverty in Saiha district, Mizoram. The research questions that education may play an important role in delaying the age of marriage. It was found in many parts of the world that girls with higher education and already

¹ Corresponding Author

employed in the service sector choose to get married later than those who do not work or are engaged in modern occupations. Second, it has also been assumed that place of residence, whether rural or urban, is also believed to be one of the determinants of the age of marriage. Third, poor families are more likely to get married earlier by compulsion for their economic survival because being dependent on their parents for a long time is sometimes regarded as a burden in a family. Therefore, when young girls marry early, particularly to a rich husband, it can be a big relief to their parents. This kind of marriage relationship was prevalent even in the history of Mizoram. With this background introduction, the present research limited its scope to the relationship between age of marriage and level of education, place of residence and poverty in the Saiha district.

Study area: Saiha District is between $92^{\circ} 30' - 93^{\circ} 15'$ E and $21^{\circ} 5' - 22^{\circ} 60'$ N. It is one of the eleventh districts of Mizoram, located in the southeastern part of Mizoram. The Chin state of Myanmar bounds it on the east and south of the district. Lawngtlai District, Mizoram, is bounded by the north and the west. The geographical area of the Saiha district is 1399.9 square kilometres.



Data source and Methodology

There are two main sources for the present research. One is secondary data like the Census of India-2011, National Family Health Survey-5, statistical handbooks, journals and books, Sample Registration System (SRS) etc. It is, however, mainly based on primary information. In addition, intensive systematic fieldwork has been carried out in the Saiha district, Mizoram study area.

Sample Design

For choosing the sample villages, a position on compiling population data from the Census was taken from the Deputy Commissioner Complex, Saiha. The population data consist of different villages

with the number of households, number of children, sex and number of literates in Saiha and Tuipang Rural Development (RD) blocks and Saiha Urban area.

Based on the collected data, an attempt has been made to obtain sample settlements in the said RD blocks and the urban settlement of Saiha. The sample and its size have been obtained by arranging all settlements of Saiha rural development block, Tuipang rural development block and Saiha urban separately in descending order from the percentage of literacy. (Literacy is chosen as a medium of arrangement because it impacts marriage patterns).

From urban and RD blocks, Quartile 1, Quartile 2 and Quartile 3 have been selected for the study. Thus, nine settlements had chosen by using the following method of identification:

$$Q1 = \frac{1(n+1)^{\text{th}} \text{ item}}{4}$$

$$Q2 \text{ (median)} = \frac{2(n+1)^{\text{th}} \text{ item}}{4}$$

$$Q3 = \frac{3(n+1)^{\text{th}} \text{ item}}{4}$$

Household sample

A diverse simple random method chooses households in a village or urban ward. Households of different types like Thatch, Assam type and RCC, which are important indicators of the economic condition of a family, represent the base for choosing the sample randomly. From each village or urban ward, 20% of the sample households are selected. Therefore, a complete household sample from rural and urban areas is 291 households taking one couple per household, meaning that 291 couples and 1079 children are studied for the sample.

Questionnaires

The questionnaire collects necessary information about the family, which any family member could answer freely. This questionnaire comprises of Household questionnaire and a Women's questionnaire. Under the household questionnaire, information like marital status, sex, year of marriage, level of education, occupation, ethnic nomenclature, type of marriage, whether arranged or love etc., are collected by directly asking the respondents.

Besides, questionnaires for both husbands and wives are generated separately because some personal confidential information needs to be collected from the spouses.

Quantitative technique used for the analysis of data

Spearman's rho for the non-parametric test is used to measure the strength of the relationship of association between two variables, calculated using a tool called Statistical Package for the Social Sciences (SPSS). Mean, Simple percentage, bar chart, polygon, and ratio are commonly used to analyse data.

Age of marriage of boys and girls: The age of marriage for couples is divided into various categories. According to the law of 2006 by the prohibition of the Child Marriage Act of India, the legal age of marriage forms the base of grouping. For boys, it is categorised from the lowest to the highest as <21, 21-27, 28- 34 and .35; for girls, it is <18, 18-24, 25-31 and >32.

Literacy and sex ratio: In literacy divisions, the non-literate form the base level indicating illiterate persons. Above this, an education level below class X indicates a low level of education. Higher than this level is class 11 & 12, graduate and postgraduate.

Results and Discussion

This section covers the analysis of the role of education, place of residence and poverty on the age of marriage in the Saiha district.

Education and age of marriage

Various pieces of literature clearly show that educational level is one of the determinants of the age of marriage. A low level of education is understood to be related to being married at a young age. In communities where early marriage is widespread, there was a high drop-out rate in school, which signifies that marriage is a barrier to higher education. There has also been an opinion among many people that spending resources for the education of boys is more fruitful and economically more rewarding than resources spent for girls' education since girls are only considered to be homemakers by their parents, or otherwise, girls are more vulnerable to get married earlier than boys. Some study reveals that girls' higher education in Bangladesh acts partly as a substitute for a more considerable dowry. In addition, some parents consider that educating girls is unnecessary for their roles would only be a good housewife at the end of the day.

Level of women's education and age of marriage

This section analysed the educational level of girls and their age of marriage in Saiha District, Mizoram. The cross-tabulation of the table-1 displays different age groups ranging from underage, i.e., below 18 years of marriage, 19-24 years, 25-31 years and above 32 years. Out of the total sample of 291, 4.47% of girls are illiterate; 76.63% are below class 10 educated; 14.09% are attaining class 12 education; 4.47% are graduates; and 0.34% are postgraduates.

Table 1: Saiha District: Percentage of the level of education of marriage age of girls

Education level grouping of women	Age Group of Women								Total Age Group	% from the total samples
	< 18		19 - 24		25 -31		>32			
	N=291	% from the total level of education	N=291	% from the total level of education	N=291	% from the total level of education	N=291	% from the total level of education		
Illiterate	1.03	23.07	3.09	69.23	0.34	7.69	0	0	13	4.47
10 and below	23.37	30.49	41.24	53.81	9.28	12.11	8.75	3.58	223	76.63
Class 12	1.72	12.19	7.22	51.21	5.15	36.58	0	0	41	14.09
Graduate	0.34	7.69	2.41	53.84	1.72	38.46	0	0	13	4.47
Post Graduate	0	0	0	0	0.34	100	0	0	1	0.34
Total	26.5		53.95		16.84		2.75		291	

Source: Field Survey, 2019

As shown in the table-1, under-age marriage is most common among illiterate girls and below class 10 level educations, followed by class 12 passed educated girls, while those girls attaining graduate and postgraduate recorded a minimal number of under-age marriages.

It is interesting to note here that all women in the age group of 32 and above are below class 10 and have passed. The highest number of marriage age groups, i.e., 18-24, also has the highest figure of marriage under class 10 education. The table also shows that underage marriage is decreasing with the increase in education.

Statistical validity

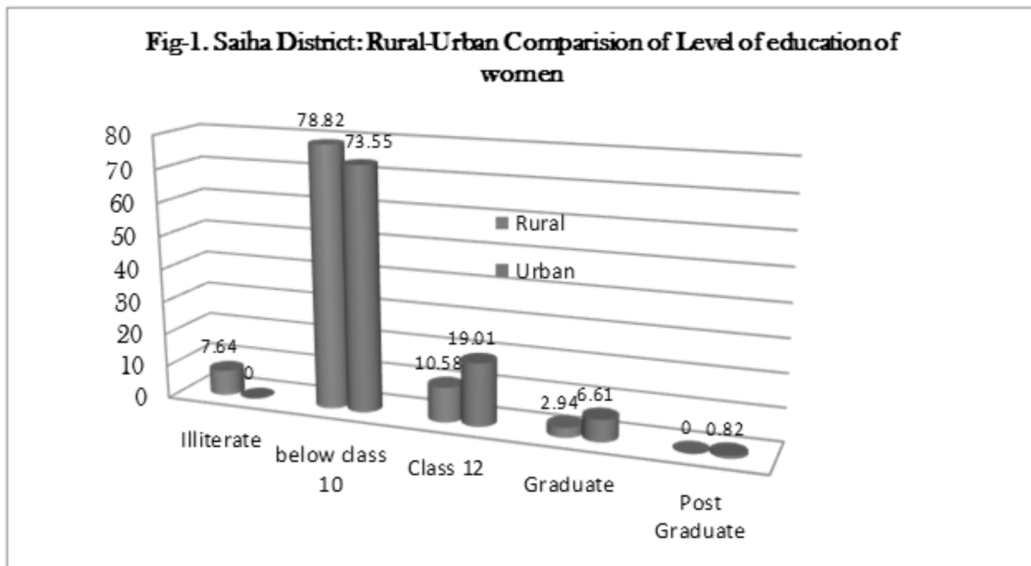
The correlation of the age group of women and level of education is positively correlated with a significant level of 0.01, which exposes that educational level plays a vital role in determining the age of marriage among girls in Saiha district ($r=0.216$). It means that girls' marriage age increases with higher education levels and vice-versa.

Table 2: Saiha District: Correlations between the level of education and female age of marriage

			Age Group of Wife	Education Level of Wife
Spearman's rho	Age Group of Women	Correlation Coefficient	1.000	.216**
		Sig. (2-tailed)	.	.000
		N	291	291
	Education level Wife	Correlation Coefficient	.216**	1.000
		Sig. (2-tailed)	.000	.
		N	291	291
**. Correlation is significant at the 0.01 level (2-tailed).				

Rural to Urban comparison of the level of education and age of marriage among girls

There are 170 samples of women in urban areas and 121 samples in rural areas. Out of 121 samples in rural areas, 7.64% of women are illiterate, 78.82% are below class 10, 10.58% are class 12, and only 2.94% are graduates. No women are attaining a postgraduate level of education in rural areas. In Urban areas, all women are literate. However, the majority of the women (73.55%) are below class 10 level education, 19.01% of them are attaining at least class 12 education, 6.61% are graduates, and just 0.82% are postgraduate level education.



The similarity between rural and urban areas is that most women in both areas are below class 10 passed, followed by class 12 passed educated mothers and graduates. No single women

educate postgraduates in rural areas, while just 0.82% are in urban areas. It has been observed that rural-urban variations in education level and marriage age in the Saiha district. Another similar characteristic of rural and urban Saihais that under-age married are common among women below class 10.

As shown in the table-3, marriage is most common among the age group of 18-24 years of age in both rural and urban areas, followed by the age group below 18 (underage marriage) and the age group of 25-31, while the late marriage of after 32 years of age is not common in both rural and urban residences.

Table-3. Saiha District: Rural-Urban variation on level of education and age of marriage among girls

Rural-Urban			Age Group of women								Total
			Below 18		19 to 24		25 to 31		32 & Above		
Rural	Education level of women	Illiterate	3	23.07	9	69.23	1	7.69	0	0	13
		10 and below	43	32.08	68	50.74	17	12.68	6	4.74	134
		Class 12	2	11.11	10	55.55	6	33.33	0	0	18
		Graduate	0	0	3	60	2	40	0	0	5
	Total		48		90		26		6		170
Urban	Education level of women	10 and below	25	28.08	52	58.42	10	11.23	2	2.24	89
		Class 12	3	13.04	11	47.82	9	39.13	0	0	23
		Graduate	1	12.5	4	50	3	37.5	0	0	8
		Post Graduate	0	0	0	0	1	100	0	0	1
	Total		29		67		23		2		121
Source: Field Survey, 2019											

It is found that underage marriage among girls is still prevalent in rural and urban areas, with girls attaining below the class 10 level of education and illiteracy, particularly in rural areas. Most women marriages in the 18-24 attain just class 10 or below education while the late marriage of girls above 32 years is uncommon in Saiha district. By and large, girls living in rural areas marry earlier than those living in urban areas. Research revealed an association between girls' early marriage and low levels of education in the Saiha district.

Level of husbands' education and age of marriage

The level of education of boys from the total sample of 291 exposes that the highest samples of educational qualification fall in the category of class 10 and below (69.76%), followed by class 12 (13.40%), graduate (12.71%) and illiterate (2.75%). The share of boys who attained a postgraduate level of education is higher (1.37%) than that of girls (0.34%).

Table-4. Saiha District: Age group and educational level of boys

Education level grouping of man	The age group of man								Total	%
	Below 21		21 to 27		28 to 34		35& Above			
	% from the total level of education	N=291	% from the total level of education	N=291	% from the total level of education	N=291	% from the total level of education	N=291		
Illiterate	25.00	0.69	25.00	0.69	0.00	0.00	50.00	1.37	8	2.75
10 and below	21.18	14.78	54.18	37.80	20.19	14.09	4.43	3.09	203	69.76
Class 12	15.38	2.06	53.84	7.22	28.21	3.78	2.56	0.34	39	13.40
Graduate	13.51	1.72	45.94	5.84	37.83	4.81	2.71	0.34	37	12.71
Post Graduate	0	0	25.00	0.34	25.00	0.69	50.00	0.34	4	1.37

Source: Field Survey, 2019

As shown in the cross-tabulation-4, underage marriage (<21 age) among boys is prevalent among the illiterate boys with 25%, followed by class 10 passed (21.18%), class 12 passed (15.38%) and graduate (13.51%) level education respectively. There are as many as 25% illiterate among the 21-27. There is no illiterate man in the age group of 28 and 34. However, in the marriage age of boys 35 & above, the share of the illiterate husband is 50% scoring the highest per cent of all the illiterate samples of boys.

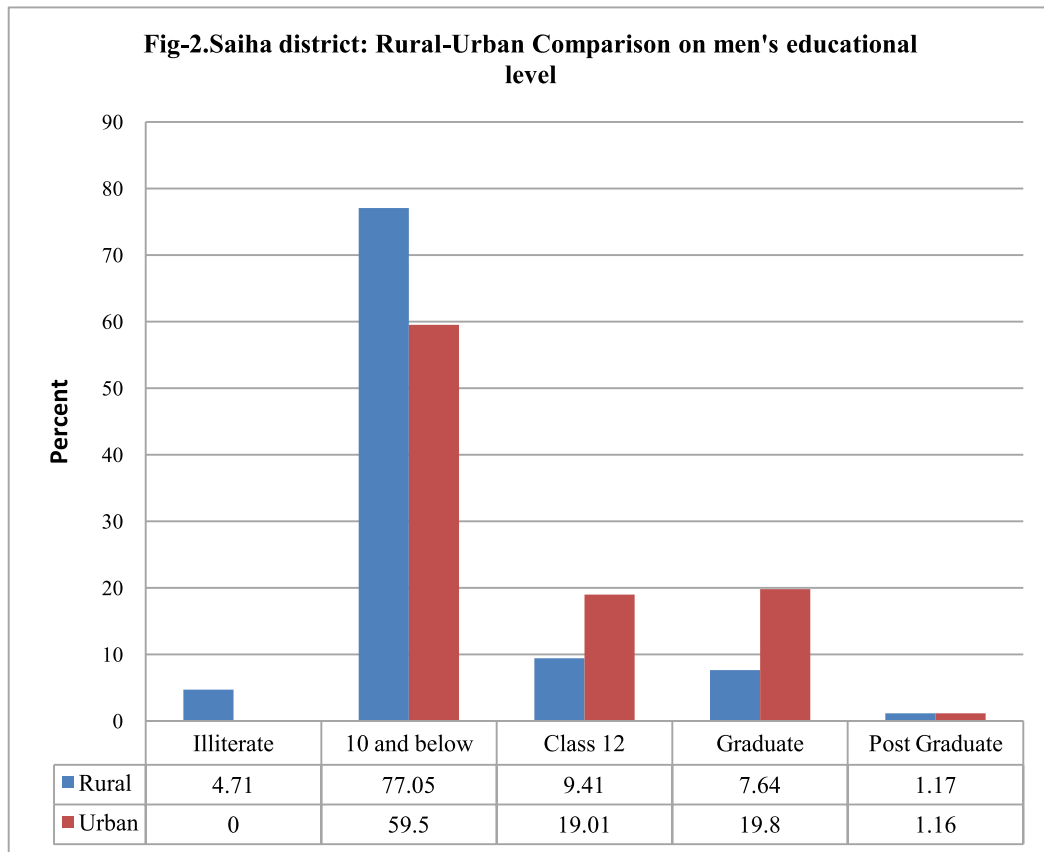
In the educational level of class 12, the highest share percentage belongs to the age group of 21-27, followed by the age group of 28-34, with a percentage of 28.21. The age group below 21 shares 15.38%, and the smallest percentage is shared by the marriage age group of 35 & above, with only 2.71% of the total educational level.

The education level of graduates is 13.51% among boys below 21 age of marriage, 45.94% of the age group of 21-27, 37.83% of the age group of 28-34 and 2.71% of the marriage age group of 35 & above. At post graduate level, there is no underage marriage of boys.

Statistical tests show no significant correlation between the education level of men and their age of marriage in the Saiha district. However, the above analysis revealed that underage marriage of boys becomes common among the illiterate compared to boys attaining a higher level of education, whereas there are a maximum number of illiterates among the age group of 35 and above.

Rural-urban comparison of men’s educational level

Fig-2 shows the rural-urban variation in the level of education and age of marriage among men. In rural areas, 4.71% of men are illiterate, 77.05% are class 10 & below, 9.41% are class 12 passed, 7.64% are graduates, and just 1.17% are postgraduates. In urban areas, there is no illiterate while the lowest level of education among men in urban areas is class 10 & below with 59.50%, while 19.01% of men attained up to class 12, and almost a similar number of them attained graduate level education (19.8%) while merely 1.16% of men are getting postgraduate degrees.



The research found differences between rural and urban men in the Saiha district as far as the level of educational attainment is concerned. In the meantime, it is also observed that men attaining below class 10 got maximum proportions in both rural and urban areas.

The age group of men and their level of education

The present study revealed that underage marriage is most common among men who are attaining class 10 or below, with a huge shared of 87.5% in rural areas, followed by men who are illiterate and graduate level education with 6.25% each marriage before attaining the legal age of 21 years while there is no report of underage marriage among men who attained up to class 12 education.

In the rural area, the highest percentage of underage marriage happened among the men who attain class 10 or below in urban areas, with a large proportion of 62.5%, followed by class 12 passed

(25%) and graduate-level education (12.5%). Another similarity between rural and urban areas is that maximum married happened among the age group of 21-27 with the educational level of class 10 or below (table-5).

Table 5: Saiha District: Age group and education level of males

Rural-Urban		Education level grouping of males											Total
		Illiterate		10 and below		Class 12		Graduate		Post Graduate			
Rural	The age group of man	Below 21	6.25	2	87.5	28	0	0	6.25	2	0	0	32
		21 to 27	2.19	2	78.02	71	12.08	11	7.69	7	0	0	91
		28 to 34	0	0	70.58	24	14.71	5	11.76	4	2.94	1	34
		35 Above	30.76	4	61.53	8	0	0	0	0	7.69	1	13
	Total		8		131		16		13		2	170	
Urban	The age group of man	Below 21	0	0	62.5	15	25	6	12.5	3	0	0	24
		21 to 27	0	0	65	39	16.66	10	16.66	10	1.66	1	60
		28 to 34	0	0	50	17	17.64	6	29.41	10	2.94	1	34
		35 Above	0	0	3.33	1	3.33	1	3.33	1	0	0	3
	Total				72		23		24		2	121	

Source: Field Survey, 2019

It is interesting to find out that there are no illiterate men in all the age groups in the urban area, and the level of education begins with class 10 & below in all the age groups. The present study shows that the majority of men in the Saiha district got marriage at the age of 21-27 years, and the maximum of them got marriage when they attained class 10 or below, which is also true in the case of girls both in the rural and urban areas. Therefore, it may be concluded that class 10 level school drop-out among boys and girls leads to early marriage in the Saiha district.

Poverty and Marriage

Poverty is considered one of the most influential factors determining the age of marriage worldwide, particularly in developing countries. The situation gives rise to a feeling of discrepancy in society. For many poor families, marrying their daughter is a policy for economic sustenance. Therefore, poverty is believed to be one of the causes of early marriage, especially among girls.

For the present research, Below Poverty Line (BPL) and Antyodana Anna Yojana (AAY) are considered to measure poverty. The AAY scheme introduced in 2001 represents the poorest of the poor, while the BPL is an economic benchmark to indicate economic disadvantages and to identify individuals and households in need of government assistance. Therefore, the number of couples holding BPL and AAY card are considered for poverty measurement. On the other hand, people having a white ration card are categorised as Above Poverty Line (APL) as the indicator of not being poor.

The entire respondent for this study is 291 couples. Out of these are 199 Above Poverty Line (APL) couples, 73 BPL couples and 19 AAY couples. Of 199 APL women, there are 55 in the age group below 18 of marriage age of girls (underage), 105 females in the age group of 18-24, 36 females in the age group of 27-31 and only 3 in the age group of above 32 years.

Out of the total BPL card holders, there are 19 females in the age group of below 18 years, 39 females in the age group of 18-24, 11 females in the age group of 25-31 and 4 females in the age group of above 32 years.

Relationship between poverty and age of marriage

Poverty and Above Poverty, as mentioned above, are the two categories to analyse the relationship between poverty and marriage age. From the 291 samples, 92 (31.61%) couples live in poverty. Out of 92 poor husbands, 22 (23.9%) belong to underage marriage (<21 years), 44 (47.8%) are in the age group of 21-27, 17 (18.5%) are in the category of 28-34 age group and just 9 (9.8%) are in the age group of 35 and above.

Table 6 : Saiha district: Age group of husband and wife and poverty

The age group of Husband		Poverty			Total
		Above Poverty	Husband with Poverty card	% Husband Poverty	
	Below 21	34	22	23.9	56
	21 to 27	107	44	47.8	151
	28 to 34	51	17	18.5	68
	35 & Above	7	9	9.8	16
Total		199	92	100.0	291
		Poverty			Total
		Above Poverty	Wife with a Poverty card	% Wife Poverty	
Age group of wife	Below 18	55	22	23.9	77
	18 to 24	105	52	56.5	157
	25 to 31	36	13	14.1	49
	32 & above	3	5	5.4	8
Total		199	92	100.0	291
Source: Filed work, 2019					

Out of 92 (31%) poor women, 22 (23.9%) belong to the underage group (below 18 years), while a maximum number of 52(56.5%) are in the age group of 18-24 and 13 (14.1%) are in the age group of 25-31 while the remaining 5(5.4%) are in the age group of 32 and above (Table6).

Even though there is no significant statistical correlation, table-8 reveals a relationship between poverty and age of marriage as underage marriage becomes the second highest poverty in both men and women, with 23.9% each in the study area.

Conclusion

It can be concluded from the overall analysis that education plays the most significant role in the causes of early marriage in the Saiha district. The correlation of the age group of women and level of education is positively correlated with a significant level of 0.01, which showed that educational level plays a significant role in determining the age of marriage among girls in Saiha district ($r=.216$). It means that girls' marriage age increases with higher education levels and vice-versa.

It is found that underage marriage among girls is still prevalent in rural and urban areas, with girls attaining below class 10 levels of education and illiteracy, particularly in rural areas. Most girls' marriages happened among the 18-24 who are attaining just class 10 or below education, while the late marriage of girls above 32 years is not common in Saiha district. By and large, girls living in rural areas are married earlier than those living in urban areas. There is an association between girls' early marriage and low levels of education in the Saiha district.

Statistical tests show that there is no significant correlation between the educational level of man and their age of marriage in the Saiha district. However, the present study revealed that the maximum number of marriages of boys happened between the ages of 21 and 27 in all education levels. It is also found that underage marriage of boys becomes common among the illiterate compared to boys attaining a higher level of education. It is also observed that there are maximum numbers of illiterate among the age group of 35 and above.

Research showed differences between rural and urban men in the Saiha district as far as their level of educational attainment is concerned. In the meantime, it is also observed that men attaining below class 10 got maximum proportions in both rural and urban areas.

It is interesting to find out that there are no illiterate men in all age groups in urban areas. However, the present study shows that most men in the Saiha district got married at 21-27 years, and most of them got married when they attained class 10 or below, which is also true for girls in rural and urban areas. Therefore, it may be concluded that class 10 level school drop-outs become the biggest push factor for boys and girls to get married in the Saiha district.

Even though there is no significant statistical correlation, the study revealed a relationship between poverty and age of marriage as underage marriage becomes the second highest in relation to poverty in both men and women, with 23.9% each in the Saiha district.

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Indian 'Urban' Classification at Crossroad

Gopa Samanta, The University of Burdwan

Abstract: 'Urban' is classified primarily by the Census of India, a central government institution, which can declare a settlement as Census Town (erstwhile non-municipal town), and this method applies to all States irrespective of their different geospatial conditions. This urban classification by the Census is the primary process of identifying the future urban areas of that particular State. However, the criteria for classifying urban settlements is age-old and does not have much context in present-day India. This article takes up the earlier debate of urban classification on board and extends it to a new level by using the author's experience of extensive fieldwork carried out on both the Census Towns and small Statutory Towns in different parts of eastern India (Jharkhand, Bihar, and West Bengal). The article argues that these criteria need complete restructuring. To make the data system better capable of capturing the real-world urban phenomenon in India, it needs a change in criteria and a new data collection format by the Census of India.

Keywords: Urban classification, Threshold population, Non-farm activities, Continuous built-up area, Gender-sensitive criteria

Introduction

Although the tradition of population enumeration, officially called Census operation, was started in 1872 by the then-British Government, the first Census in Independent India took place in 1951, after four years of Independence. According to that report, 17.3 per cent of the Indian population lived in urban areas in 1951, which resulted from a high decadal growth rate in the 1940s, a growth rate of 41.42 per cent against 31.37 per cent in the earlier decade. The decadal growth rate of the urban population during the 1940s was the second highest till 2011, surpassed only by 46 per cent during the 1970s (Appendix 1). Much of this contribution to urban population in the 1940s came from partition and consequent international refugee migration from the then West and East Pakistan to Indian cities, especially in West Bengal, Punjab and Delhi, and also from rural to urban migration led by famine, agrarian distress, and poverty during the decade of partition.

During the last seven decades, both the urban situation and the urban landscape have undergone tremendous changes. The change in the level of urbanisation, i.e., the percentage growth of the urban population compared to the total population, was more or less around 1 to 2 percentage points in those decades except in 1981 and 2011, both of which experienced 3.4 per cent growth of urban population. Unfortunately, we still do not have any data on the current urban situation in India at the settlement level, as there has been no Census operation since 2011. However, during the last two decades, urban growth in India has taken on a different shape. It has been oriented more towards new territorial expansion and growth of small cities in areas beyond the metropolitan shadow (Samanta, 2017b) than the earlier trend of urban densification and peri-urban expansion of big cities (Appendix 2).

Following this new trend, there is an enormous increase in the number of Census Towns (settlements classified as 'urban' by the Census of India), but the growth of Statutory Towns is not so high. In the first decade of the 21st century, the number of newly classified towns was 2532, whereas only 242 settlements were granted statutory status by the different State Governments. There is also an intense debate about this kind of urban growth. Some experts, such as Kundu (2011:15), claimed that this is Census activism, which is partly true as the State Directorates of Census have been given

some discretionary power to identify such towns. Moreover, the classification criteria for declaring a settlement as a town by the Census of India devised in 1961 are being continued to date. Other scholars like Bhagat (2018 p. 6) claim that as India's definition of urban is quite stringent compared to other South Asian countries, its level of urbanisation is even lower than that of Pakistan and several African countries. A bunch of research on the macro picture of India's Census Towns (Pradhan, 2013; Roy and Pradhan, 2018; Punia et al., 2017) and in-depth micro-scale empirical studies of specific Census Towns (Roy, 2022; Guin, 2018, Sircar, 2016; Mukhopadhyay et al., 2016; Samanta, 2014 and 2017b) show that the urban transformation is happening at a much faster rate and in areas beyond the shadow of metropolitan cities. These empirical studies also observed that the development and growth of a place-based non-farm economy at the local level facilitates the emergence of a higher number of newly classified Census Towns.

A team of scholars working under the project entitled 'Subaltern Urbanization in India' looked into small towns (both Census and Statutory Towns below 1,00,000 population size) to understand the patterns and processes of urbanisation in India beyond big and metropolitan cities. Several empirical studies carried out by this team showed that urbanisation in India has diversified forms. However, a common pattern is the clustering of settlements into small agglomerations, which the Census is not capturing in classifying settlements as 'urban' (Denis and Zerah, 2017). The economy may be banal, but it is linked to local or global chains. Some studies, such as Roy and Pradhan (2018), noted the anomaly in the urban classification system, and it is claimed that the Indian Census is failing to represent the actual urban situation of India because of their erroneous classification policies. I also have pointed to this anomaly through my previous research in the context of West Bengal (Samanta, 2012 & 2014). Many towns are not classified as Census Towns despite having an agglomeration of non-farm activities (Sarkar, 2022). In contrast, there is also a range of Census Towns which do not qualify to be declared as urban settlements (Roy, 2022).

Against the above backdrop, the present article unpacks the paradoxes in classifying the 'urban' and its trajectories over the last seventy-five years in independent India. The article critically looks at the measurement criteria of 'urban' and points out the generic problems in classification by the Indian Census. It explains why and how rural/urban classification gets problematic in India. However, the article does not take any side on the debate of under-representation or over-representation of the urban in India, which is very common among the earlier studies on classification. The principal argument in this article revolves around the problems inherent in the classification system following the stipulated norms set in 1961 and its probable solutions so that the data system can represent a more realistic picture of urban India. The argument of this article is based on an analysis of the current debate on urban classification, complemented by my research over the last three decades in understanding the 'urban' in the form of small and medium towns (both Statutory and Census Towns) in India.

Classifying 'Urban' by Indian Census

Identifying a settlement as 'urban' in India starts with the Indian Census Authority, which identifies Census Towns (erstwhile non-municipal towns) while organising the population data during each census year. The method of their identification follows the norms set by the 1961 Census authority to classify a settlement as 'urban' based on the following criteria: 5000 population size; 400 persons per sq. km.; and three-fourths of the occupation of the working population outside of agriculture. In 1971, the third criterion was modified to exclude women workers and, accordingly, was changed to '75 per cent of male workers engaged in non-agricultural sectors. In 1981, the Census changed the counting of the non-farm workforce and excluded workers engaged in livestock, forestry, fishing, hunting and plantations, orchards and allied activities (Bhagat, 2005). The same criteria for urban classification continued till 2011 when the marginal workforce was excluded entirely, and only the main workforce (engaged in an occupation for over six months) was only taken into account.

Moreover, the Census has stopped publishing ten workforce categories at the *mouza* or village level and has reduced the number of categories to four since 2001. This new categorisation includes non-farm activities within the 'other workers'. This erases the nature of non-farm activities, which helps to understand the nature of urbanisation. The threshold population size and density are unrealistic to the ground situation, as both the size and the density of Indian villages have increased many times since 1961.

The studies noted the lack of parity between the set norms and the actual classification measures (Roy & Pradhan, 2018; Samanta, 2014), which dealt with both the macro data and micro-level analysis. The problems are many, and I do not have a concrete proposal on every issue, but in this article, I intend to analyse the roots of these problems and would like to come up with certain specific recommendations for consideration. After 75 years, it is high time to reconsider the classifying criteria of urban settlements regarding population size, density, and the measurement of the non-farm workforce. In this article, I additionally argue for newer factors and characters to be considered for classifying urban settlements instead of just focusing on the demographic criteria. These can include checking the built-up area, introducing new categories of the workforce, including the female workforce, and checking physical growth beyond the *mouza* (revenue village) boundaries with the help of geospatial data. The following sections bring the current system's problems to the fore and the corrective measures proposed to be incorporated.

Threshold Population Size and Density

The Indian Census considers 5000 as the threshold population size to classify a settlement as urban. That size must be backed up by two other criteria: density and proportion of male main non-farm workforce participation. However, the classification process starts with the size, so the size threshold must be realistic. This size of 5000 was probably appropriate for the 1961 situation but cannot be satisfactorily applied to the present context if we consider the growth of the total population and the growth of the urban population. The total population in 2011 was 2.8 times that of 1961, whereas the urban population increased during the same period by 4.7 times. Although the natural growth rate has declined, migration from rural to urban areas has accelerated much faster due to the decay of the farm sector and the booming of informal service sectors in both urban and 'rurban' areas. Therefore, the population size criterion cannot continue to be set at 5000, as the number of Indian villages above that mark will probably surpass the number below 5000. If a small hilly country like Nepal can have a population criterion of 9000 for declaring a settlement as 'urban' (Bhagat, 2005), how can India continue with the 5000 population mark? Considering the growth of the total population (2.8 times) and the urban population (4.7 times) in the country, the threshold size should be increased at least two to three times. Similar is the condition for the density threshold—400 persons per sq. km is too low for Indian villages. Even in highly vulnerable areas like the Indian Sundarban, 44 per cent and 77.6 per cent of the villages with a population above 5000 had a population density of more than 1000 and 800 per sq. km. respectively, in 2011.

Moreover, the mean density of all 295 villages above the 5000 population mark was 1,235 in 2011. The Indian Sundarban does not belong to a high-density area; therefore, this data indicates how unrealistic the density criteria are of 400 persons per sq. km. It should be increased at least twice, i.e., 800 persons per sq. km. Ramachandran (1989) suggested increasing this density criterion to 1000 persons per sq. km.

This recommendation may trigger a debate on the fact that if the threshold population size is lifted, the level of urbanisation might go down, which is already low compared to many other countries in Asia and even Africa. It is already claimed by some scholars (Bhagat, 2018) that the level of urbanisation is low in India because of stringent measurement categories. However, I have already stated that this article does not enter into the debate on under- and over-representation of the level of urbanisation; instead, it argues for a closer representation of the ground situation of India's urban landscape. Additionally, it argues that this change in threshold population will not reduce the

level of urbanisation, as many States of India have a huge number of settlements in the size category of 10,000 to 20,000 which were not considered urban in 2011, and it is now already 11 years past that time. For example, Sarkar (2022), in his empirical research on the Indian Sundarbans, consisting of 19 C.D. Blocks of North and South 24 Parganas of West Bengal, showed that there were six large villages above the size category of 10,000 and 5 villages in the size category of 5000–10000 population which fulfilled all other criteria but were not classified as urban in 2011. Therefore, 11 villages qualified to be classified as urban but did not appear in the Indian Census and the data system.

Non-Farm Workforce

The second puzzle is in the proportion of the non-farm workforce. In 1971, the male workforce was considered important to understand a settlement's economy, whether farm- or non-farm-based. Consideration of only male workforce has been defined as a sexist approach or gender bias of the Census of India by many scholars such as Bhagat(2005), Sivaramakrishnan et al.(2005), and Shah (2003). However, it was more realistic if we considered the condition of women in India in 1971. Both the level of education and the workforce participation of women were limited in the non-farm sectors. However, after several decades the situation is no longer close to the ground situation of 1971. Women are now found to be working in different sectors other than the agricultural labourforce. Liberalising the economy has opened and expanded avenues of women's service sector work, as exploiting women's labour at a much lower cost is always easier for private entrepreneurs. These jobs are often informal, without much security of tenure, and are purely temporary. Therefore, there is no basis for considering only male workforce participation as a criterion for classifying settlement as urban.

The problem also lies in the method of counting. The Indian Census considers two categories: the main workforce, who are engaged in a particular work for more than six months in a year, and the marginal workforce, who are engaged in one specific work for less than six months in a year. If we look at the male/female break-up of the main and marginal workforce in the same category, we will see more men in the main categories of work, and in the marginal workforce, there are more women. However, in the workforce participation criterion, the Census does not consider the marginal workforce, and by doing so, it thus eliminates the higher proportion of women who are in the marginal workforce. Thus this gender bias can be easily overcome if the workforce criteria include both marginal and main workforce.

Now the question arises: Is there any point in categorising the main and marginal workforce given today's ground situation in India, where the permanent tenure of work has reduced drastically, and the seasonality of work has increased considerably? Instead, at this juncture, our main concern regarding the workforce should be formal and informal. If the Census considers the workforce participation rate in both formal and informal categories, the proportion of women workers need not be excluded, and it can save the honour of the Census by not being sexist in setting norms for classifying urban settlements.

The question of the categories of workforce participation is an important factor which needs intense examination. The Census used to give village-level data against ten activities till 1991, but from 2001 the categories of work got narrowed down to only four: cultivator, agricultural labourer, household industry workers, and other workers. Although there has been a mandate since 1981 against counting activities like fishing and livestock in non-farm employment when classifying a settlement as 'urban', we cannot get village-level data against those activities. Neither do we have any village-level published data on categories like manufacturing and construction or trade and commerce, which may lead us to know the nature of non-farm activities in those places. 'Other workers' include workers in manufacturing and service sector activities like banking, IT, and all other works linked to service provision. Therefore, a reorganisation of workforce categories must be taken care of urgently to understand the nature of settlements in terms of their non-farm activities and the nature of urbanity.

After all, urbanisation is a socio-spatial and economic transformation process, often followed by the agglomeration of non-farm activities at any place triggered by capital accumulation under the neo-liberal global economy (Brenner & Schmid, 2014).

Built-up Area and Settlement Agglomeration

Although the demographic characteristics of a settlement were always considered to classify them as urban, the spatial nature has never received enough attention. Instead, spatial attention was given to cases such as urban agglomeration and outgrowth, which are phenomena of big urban settlements and, in most cases, have a statutory class-1 town (more than one lakh population) at the centre of such spatial focus. However, the spatiality of newly classified settlements can also be easily captured with the help of both satellite images and mapping software. Indian Space Research Organization (ISRO) is already mapping built-up areas and settlement agglomerations in India under the National Resource Census programme. As both these institutions belong to the central/union government, the Census of India can easily use the spatial data generated by ISRO. It would help to check the nature of the built-up area of a settlement very easily and may also offer information on spatial change through clustering and its journey towards urbanity.

To understand this argument of cross-checking the image of the built-up area, we need to go back to another methodological fix of the Indian Census, which counts population against a revenue village called *Mouza*. These revenue villages often do not match a single village. Sometimes there might be more than one village within one *mouza*; in some cases, one village might cut across the *mouza* boundary and extend into two *mouzas*. Therefore, while counting the eligibility of a Census Town, the Census needs to check the large villages' physical expanse and look into the settlement clusters. In almost all cases, urbanisation starts with an agglomeration effect; therefore, adjacent large villages physically merge. This agglomeration has nothing to do with the *mouza* boundaries. However, when the Census classifies a large village (*mouza*) as a Census Town, it does not consider the village clusters accommodated within the Census Town but instead maintains the boundary strictly. In my previous research on two such clusters of West Bengal—one on Singur (Samanta, 2014) and the other on Barjora (Samanta, 2017a)—I have shown that *mouza*-driven classification of Census Towns does not capture the physical reality of urban phenomena. I have shown in both cases that the actual size (both in terms of population and area) would be more than two to three times if the village clusters were considered. Spatial transformation is one of the important keys to understanding urbanity, and this cannot be measured within the limits of *mouza* or revenue villages. The Census needs to check the spatial transformation by using a wider lens with the help of geospatial technology to capture the actual urban spread rather than only using the demographic data within revenue village boundaries. Even if the Census wants to conform to *mouza* for data collection, they can merge the data against agglomerations of different *mouzas* and represent them as one Census Town.

Method of Prior Estimation in Urban Classification

The final critique is of the approximation and extrapolation method of counting population and classifying urban settlements based on previous Census data. According to Roy and Pradhan (2018) and Guin and Das (2015), for the computation of Census Towns, the Indian Census follows a complicated policy. Before the operation of enumeration, the Census classifies 'would be' urban settlements based on data from the earlier Census. They consider settlements with a 4000 population and fulfilling other criteria as Census Towns with the expectation that those settlements would cross the 5000 mark in the upcoming Census. This problem gets aggravated in the next Census when many such expected-to-be-urban settlements do not turn out to be qualified, but as they have already classified those as urban settlements, they continue with the same status. Therefore, there are many non-qualified Census Towns in each state. For example, Roy (2022), in his PhD research, has shown that out of 65 declared Census Towns in the Murshidabad district of West Bengal, based on the population in the 2011 Census, eleven do not qualify the threshold criteria of being Census Towns.

Similarly, we find evidence of overgrown villages in the 10,000 to 20,000 population size and qualifying in all other criteria, which remain undeclared as Census Towns. There were eight large villages above the size category of 10,000 and another ten villages in the size category of 5000–10,000 population, which fulfilled all other criteria but were not classified as urban in 2011 in Murshidabad district (Roy, 2022). This anomaly occurs purely because of the prior estimation and decision taken on classification based on the data from 10 years before.

The Census may follow this method of approximation. It classifies settlements before the actual Census takes place to conform to another limitation in their data generation system—village directory and town directory—to represent the level of amenities, accessibilities, and other kinds of settlement characteristics. For the data generation of these two directories, they have different formats, which they take in hand while collecting the data. Now the question is: why do we need to run a town directory questionnaire for Census Towns? Census Towns are nothing but urbanising villages and do not become proper towns unless recognised by the respective State Governments as areas under urban administration in either a town/nagar panchayat or municipalities. Therefore, for a not-so-necessary reason, the Census cannot ignore the system of capturing the urban situation in real-time of the Census operation. With the help of the digital mode of data collection, which is much easier to compile and classify, they can easily capture the actual urban situation at the ground level and in real-time.

Conclusion

The growth and nature of the urban situation have changed drastically in the globalising period, and it is beyond the capacity of the Census, with its age-old norms and practices, to capture these changes unless they go for methodological reforms of both the measurement criteria and the data collection format. This article critiques specific methods and recommends certain kinds of restructuring to make the urban classification process more grounded. First, the threshold population size should be increased to 2 to 3 times. Second, the density mark should be increased to at least two times to represent the ground reality of urban forms and structures. Third, the non-farm sector must not only stick to the main male workforce. It should include marginal workers, both male and female. In the context of present development discourses, it is challenging for a poor household to stick to one particular activity for a year or more than six months. Multiple activities and seasonal non-farm activity have become the norm for poor people's livelihood security; that percentage of people is no less in any place in India, be it rural or urban. If the Census considers marginal workers, it does not need to be limited to only male workers, as more women workers are in marginal categories. The Census should thus take a gender-sensitive approach towards the workforce by eliminating the long-practised sexist approach of sticking to the main male workforce only, which is unnecessary in the current context.

Thorough checking of expansion and nature of the built-up area and the settlement agglomeration demands attention to verify the urbanity of settlements, as the form of agglomeration makes a settlement urban. These agglomerations often have nothing to do with *mouza* boundaries but are linked to accessibility and connectivity factors. Therefore, classifying a settlement as Census Town should be preceded by checking the nature of agglomeration, if any, using geospatial images. In declaring Census Town, it would be wise to consider these *mouzas* together to declare them as one Census Town by merging *mouza* boundaries rather than classifying adjacent *mouzas* as separate Census Towns.

Last but not least, the Census needs to restructure the activity classes—there is a need for new categories against a) manufacturing and construction, b) trade and commerce, and the category called 'other workers' should purely consider the service sector activities. These three categories can give a better idea about the urban transformation of Indian villages rather than just checking the proportion of non-farm activity. The current classification follows an exclusionary policy by eliminating farm and farm-like activities such as fishing and plantation, which should be changed to an inclusive one focusing on the nature and sectors of economic activities leading to settlement

agglomeration and urban expansion. Above all, these three categories also need a formal and informal break-up, along with a gender break-up which will automatically make the main/marginal categorisation of the workforce redundant and urban classification gender sensitive. After 75 years, we need to introspect on how we can capture the urban situation at the ground level with more realistic parameters and criteria, and that is the call of the day in the year of *Azadi ka Amrit Mahotsav*.

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Appendix-I: Level of Urbanisation and Growth Rate: 1941-2011

Census year	Per cent of Urban Population to Total	Decadal Growth Rate
1941	13.9	31.9
1951	17.3	41.4
1961	18.0	26.4
1971	19.9	38.2
1981	23.3	46.0
1991	25.7	36.2
2001	27.8	31.1
2011	31.2	27.6

Appendix II: Distribution of Cities and Towns across Categories (2001-2011)

Based on Population Size			
<i>Categories</i>	<i>Sizes</i>	<i>2001</i>	<i>2011</i>
Million Cities	More than 1 million	35	53
Class-I	1,00,00 to 1,000,000	413	452
Class-II	50,000 to 1,00,000	498	605
Class-III	20,000 to 50,000	1389	1905
Class-IV	10,000 to 20,000	1564	2233
Class-V	5,000 to 10,000	1043	2187
Class-VI	Less than 5,000	235	498
Total		5177	7933
Based on Status			
Statutory Town		3799	4041
Census Towns		1362	3894
Urban Agglomerations		384	475

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Geo- Reflections**Cartographic Traditions, Innovations and Revolutions:
The Arrival of Digital Cartography in India****K. R. Dikshit, Pune**

Cartography as a medium of expression and illustration is known to have existed in antiquity. The historians of cartography go as far as to view a line etched on a piece of a tusk, dated to 25,000 BC, as a simplified form of cartography. While this may not quite fit with our idea of cartography, many other representations of the outline of the world, or a part of it, cannot be denied their claim as valid pieces of cartographic representations. "The earliest extant example of a portable map dates to the Babylonian empire and is dated circa 3800 BC. The Babylonians were pioneers in studying the world and its place in the cosmos, crucial in the development of Cartography" (Swift, 2006, p.11). One, however, wonders if a clay tablet with an etched impression of a river and a delta that the Babylonian map represented could be considered a map.

Most of the old maps, one may call them ancient, generally originated in the Mediterranean region. One of the earliest thinkers was Anaximander of Miletus (611-546 BC), who drew the first map of the known world. Other early maps of the world, howsoever incomplete and crude they may appear, by Hecataeus (550 BC), Eratosthenes (200 BC) and Ptolemy (150 AD), hundreds of years apart, decidedly represent the very early stage of cartographic evolution in the world. Based partly on their knowledge of the physical world and partly on logical imagination, early Greek geographers prepared small-scale maps of the world, often confined in a circle. They had a compelling attraction to show the world (known to them) in a limited circular frame, corresponding with the shape of the world.

The map prepared by Claudius Ptolemy was on a sounder footing, as by the mid-second century AD, more of the world, especially Asia, was known from the conquests of Alexander and many travellers. However, equally pertinent is that by the time Ptolemy appeared on the scene at the close of the second century AD, one of the greatest geographical principles of locational coordinates (latitude and longitude) was well established. It would be appropriate to point out that the coordinates of a place, expressed by latitudes and longitudes, now taken as a given fact, is a major geographical contribution made by Hipparchus (190–120 BC), a Greek geographer and astronomer. The coordinates were used for the first time by Ptolemy in his well-known semi-spherical map of the world, extending from the shores of the Atlantic in the west to the China Sea in the east, with the Ganges delta thrown in the eastern segment.

The appearance of an Arab world in the Mediterranean region, covering a large part of North Africa, part of Spain and other regions around the Mediterranean, coincided with a simultaneous emergence of many Arab scholars interested in the world's geography. One such scholar who is widely recognised as a cartographer was Muhammad-Al-Idrisi (1100–1169), who produced some of the most accurate maps of the medieval Islamic period, known as "Tabula Rogeriana" (1154 AD), a kind of medieval atlas with 70 sheets. The atlas consisted of a series of rectangular maps based on the knowledge gathered from travellers. Besides the Mediterranean world, it contained maps of parts of Africa and the Indian Ocean. An uncommon feature of the maps was the direction, the north pointing downward, and to orient it according to modern convention, the maps with Arabic scripts had to be turned upside down for proper orientation.

Exploration Phase and Cartography

Much of the world was discovered in less than a hundred years, from the beginning voyage of Columbus in 1492 to the end of the exploratory voyage of Magellan in 1522. Almost at the same

time, when Columbus was exploring West Indies and brought forth a wealth of information about the new world, Vasco da Gama, in an attempt to discover the spice land, sailed east, landing at Calicut (now Kozhikode) on the Indian coast in 1498. To find a western route to the East Indies, Magellan circumnavigated the world, traversing the Atlantic Ocean, sailing along the east coast of Latin America and crossing over to the Pacific, through the Magellan Strait, reached the Philippines, where local tribes killed him. James Cook, however, discovered Australia later in the 18th century.

Knowledge and Cartography of the Globe

What is important to realise is that by the close of the 15th century and the beginning of the 16th century, the outline of much of the globe, with its oceans and continents, was known enough to induce the cartographers of the world to attempt a map of the earth on the globe. Renaissance, as we call this period, was when all round growth of knowledge was accelerated, especially in science: and this also impacted cartography. The invention of theodolite in the 16th century, much improved by Jonathan Sisson (1725) in what was, till lately, a modern theodolite, gave the necessary impetus for producing maps based on accurate measurements. It is said that “most of the cartographers of the fifteen-century lived either in Venice or Genoa because it was from these two places that Europeans departed on voyages to the Eastern Mediterranean, to pick up cargoes of valuable items from the east”.

Cartography in Europe

Cartography in Europe, to start with, developed in the Low Countries, like the Netherlands, though the Portuguese and Spaniards were the great explorers. The reason often advanced is the rise of the protestant sect of Christianity that allowed thinking independently without the fear of inquisition by the Catholic Church. A long list of cartographers emerged in the 15th and early 16th centuries, but these cannot be mentioned for want of space. One of the widely acknowledged, however, was Gerardus Mercator (1512-1594). Mercator is known for the world map he produced in 1569. This was an eighteen-sheet world map drawn on what is known today eponymously as Mercator projection. In this map projection, the azimuths were represented by straight lines, enabling the navigators to plot their courses by straight lines. This projection became immensely popular with sailors and enjoyed a long lease of life. Unfortunately, as we know, the distances and the areas were highly exaggerated, giving the countries a distorted shape.

Another contemporary of Mercator was Abraham Ortelius. Though the name ‘Atlas’ for a collection of maps was given by Mercator, the actual atlas, titled “Theatrum Orbis Terrarum”, was produced and published by Abraham Ortelius in 1570.

A Stable Phase in Cartography

Sixteenth century onward, a stable phase in the development of cartography occurred. More and more accurate information based on the precise survey was added, and the quality and accuracy of maps improved speedily. The old maps, like those of Ptolemy, were corrected in the light of new knowledge.

From small-scale maps of the world to large-scale maps of small areas

Following Mercator, there was a rush in the production of maps of sections of the earth, countries, provinces, coastal areas and cities. By the close of the 18th century, most continents had a relatively accurate map. The earliest map of Asia, entitled "Asia Empires, Kingdom and States", was compiled by Sieur D'Anville (1772).

The Early Indian Cartography

There are many references to cartographic works in India. Nevertheless, the British, in general, are credited with surveying and preparing accurate maps of India, or parts of it, on different scales. This

is not to say that cartography was not known in India. The Moghul emperors, especially emperor Akbar, had a penchant for surveying, but it is doubtful they had maps prepared on different scales. According to Irfan Habib (Proceedings of the Indian History Congress, vol. 35, 1974, pp.150-62), maps of the Moghul period could be included in the history of cartography. At the same time, Lahiri (2012) mentioned that in the Moghul period, a Persian world atlas showed the inhabited quarters (world) in brilliantly coloured maps.

More relevant, as an important piece of cartography, is the atlas "Maps of Moghul India" drawn by Col. Jean Baptiste Joseph Gentil, agent for the French Government in the court of Shuja-ud-daula of Faizabad, during the 1770s. "Essai Carte Generale de l'Indoustan ou Empire Mogol" was published in 1782 and reprinted in 1988 (Manohar). It is difficult to say if Gentil's maps anticipated the maps of James Rennel. One may, however, observe that Gentil's maps were more akin to sketches carrying place names and rivers. These are, nevertheless, valued as they show the partial reality of Moghul India in the 1770s.

The Arrival of East India Co., Trigonometric Surveys and the Production of Maps and Atlases

The central figure in the introduction of modern cartographic techniques and the production of maps in India is James Rennel (1742-1830), "a cartographer with interest in oceanography, turned a cartographer, who laid the foundation of accurate mapping in India". Employed by the East India Co. as the Surveyor General of Bengal, he surveyed the Ganges, prepared the Bengal Atlas in 1779, and finally prepared the earliest map of India under the title *Memoir of a Map of Hindoostan, or, The Mogul Empire* in 1782.

Survey of India and the Golden Age of Cartography

It may be emphasised that the 'Land Survey' in the USA started in 1785, just when Rennel completed his map of Hindoostan. The point to emphasise is that in India, though a colonial possession of the British, the survey and mapping work started much ahead of many other countries. The knowledge of the land was important to the British colonialists, not only for revenue collection but to explore and exploit the country's rich resources like forests and minerals.

The Survey of India was set up in 1767 to survey and map the country. The actual survey work, however, started at the beginning of the 19th century. Colin Mackenzie, the first Surveyor General of India, continued surveying the Mysore region to consolidate the East India Co's hold on the kingdom of Tipu Sultan after the latter's fall in 1799. However, a detailed trigonometric survey was undertaken only in 1802, under the leadership of William Lambton and completed in 1871, during the regime of James Walker, the then Surveyor General of India. During this long period, George Everest of Mt. Everest fame and Andrew Scott Waugh worked as Surveyors General. Theodolite (a crude one measuring one metre and weighing 50 kg) was used for the first time during this survey. The process of triangulation helped fix The Great Indian Arc of the Meridian through a web of triangulations that ran roughly along 78° E longitude, covering a distance of about 2400 km. Much of the country was surveyed by the end of the 3rd quarter of the 19th century and was concurrently mapped, putting together the survey results.

The Survey of India produced maps on different scales like million sheets, quarter-inch sheets (also called degree sheets), half-inch and one-inch sheets, the last being on a scale of one inch to a mile, the largest scale topographic map available till the mid-fifties of last century. However, the introduction of the metric system led SOI to transform these maps to 1:1,000,000, 1:250,000 and 1:50,000 (the equivalent of an old one-inch sheet) and even an enlarged version on a scale of 1:25,000.

Fixing the Zero Meridian and the International Map Series

Till the end of the nineteenth century, there was enough confusion about a zero-degree meridian. It was only in 1884 that an international conference in Washington, DC agreed on the Greenwich

meridian, which was adopted as the 0° meridian. Secondly, during the Fifth Geographical Congress in 1891 in Berne, the proposal to prepare international maps, to cover the entire world on a scale of 1:1,000,000, using uniform symbols was accepted. Thus, a set of standard maps, the so-called million sheets for the whole world, were produced. These two aspects, fixing the 0° meridian and the coverage of the world by standard million sheets, greatly facilitated the internationalisation of cartographic work.

The Survey of India has done pioneering work in all areas of surveying and mapping, notwithstanding the restrictive policy of the Government of India. They are the custodians of all related maps of the country, revising, updating and incorporating the latest information.

The Arrival of the Digital Age: A Cartographic Revolution

The arrival of digital cartography took place in the last quarter of the 20th century. The maps are now stored in digital form that can be reconstructed into a map at any time with the flick of a computer cursor. Nevertheless, conversely, the map's contents could be digitised and stored in digital form to be recalled to make a hard copy. The data, a matrix of cells in rows and columns, is stored in either vector form that digitises the points, lines and polygons or in raster form obtained from the satellite imageries in pixel form that depict a segment of the earth. Thus, both kinds of data, stored and subjected to a computer-aided Geographical Information System, provide a map of the area. The Indian Institute of Remote Sensing (IIRS), an affiliate of ISRO (Indian Space Research Organisation), has been able to train several earth scientists in the science of Remote Sensing, GIS, and the construction of maps. The result is that most universities in India have started a certificate or diploma, or even a degree course in GIS and Remote Sensing.

Applying GIS (Geographical Information System) and Remote Sensing has generated a belief and even an understanding that conventional cartography, embodying scientific principles and aesthetic elegance, is no longer needed to make maps and atlases. The satellite images representing remote sensing results have enough information to enable a trained cartographer to produce maps and atlases using conventional signs and symbols. In other words, it is possible to transform the imagery into a conventional topographic map directly. Of course, many of the non-visible attributes have to be incorporated when a thematic map is prepared. Nevertheless, the thematic maps are quite amenable to digital cartography.

The Big Debate

The Satellite imageries constructed from raster data could be transformed into a map, like a topographic sheet, with all the visible features. The question: has the country, with many university departments specialising in GIS and Remote Sensing, been able to produce maps and atlases based on these imageries or using the stored vector and raster data? Have we produced regional atlases by manipulating the GIS data? Alternatively, 'GIS and Remote Sensing' will remain confined to classrooms as a theoretical exercise. One does not deny that there are multiple uses and advantages of GIS and Remote Sensing, and its importance as a field of applied science cannot be over-emphasised. Some commercial concerns like Google have utilised the remote sensing technique to a very advanced level, to the extent that there is hardly an individual who remains untouched and does not use Google in one form or the other. Yet, we are talking about cartography.

Even today, some of the most informative and aesthetically appealing atlases continue to be produced. Another aspect is the mapping of non-geographical information, like historical facts, social organisation, or cultural practices, where an expanded skill and a degree of imagination are required to give these different aspects a visual form. It would go much beyond remote sensing. The situation will be salvaged only by a trained cartographer applying even graphic art where necessary.

Imageries are Not Maps

Though satellite images are not maps, they are instrumental in observing the ground details. These can, no doubt, be manipulated by applying specific software to classify, calculate and roughly map the surface without any attributes or names inscribed. So the real question is – Are the historical atlases (like the “Historical Atlas of South Asia” by Joseph Schwartzberg) or cultural or demographic atlases amenable to GIS and Remote Sensing exercises?

One may ask: With a band of trained personnel and increased capacity building in the universities, can we produce maps and atlases? The benefits of imageries are obvious in engineering works, forest management, agricultural land use and many other fields, but could these replace the conventional atlases and maps?

Why doesn't India produce maps of other parts of the world?

Maps worldwide are produced on different scales commercially and marketed globally. One can buy a map of India, or any other part of the world, on a scale of 1:1,300,000 with as much information as our million sheets contain, or even more, from overseas sources. A map of India and Pakistan could be brought with a 250 m contour interval on a scale of 1:1.3 million. Similarly, all kinds of atlases are produced all over the world. Neither the Survey of India nor any other commercial enterprise in India produces maps of other countries or other parts of the world and remains tethered to producing topographic, thematic maps and atlases of India. Survey of India, the National Atlas and Thematic Mapping Organization (NATMO), both Government Organisations, have stuck to traditional mapping or prepare maps in a "mission mode" as the Government of India requires.

As I see, GIS and Remote Sensing has become highly technical subject. Earth Scientists and most Government departments, like Agriculture, Mining, Forests, Fisheries and many others, use its products, mainly satellite imageries. But where is cartography?

Teaching and Research in Cartography

There are still institutes in Switzerland and Germany, among other countries, which offer Masters Programme in Cartography. It is something different from GIS and Remote Sensing. The latter is a part of the entire course structure. Let there be no impression that the art and the science of cartography is redundant.

Need for an Institute of Cartography: India badly needs an institute of cartography as an autonomous institute or an affiliate of the Survey of India. Such an institute will not only teach the latest development in cartography but will explore the frontiers of the science of map-making. If established, it would be a depository of all possible maps of all parts of the world and atlases and other cartographic literature and a permanent source of all information relating to maps of any part of the world. It may take time, but a cartographic library could be built over the years.

II

The Indian Cartographic Tradition

In the present context, it appears appropriate to look at the tradition of Indian cartography as a segment of cartographic evolution. There is some advantage in looking at the Indian tradition in two parts: 1. Early and Pre-European tradition, if any, of cartography in India, and 2. European inspired, promoted and executed works of Indian cartography. In the first case, one looks at the cartographic works executed before 16 the century: and in the second category, it is largely the plans, maps and atlases of the Indian territory or a part of it prepared after the seventeenth century. It is based mainly on the work of the Survey of India, starting with the works of James Rennel, the Surveyor General of Bengal, and subsequently of the Survey of India (SOI) and the latter's unparalleled achievements in the 19th century. More light is thrown on SOI in the sequel.

Pre-European Tradition of Indian Cartography:

The first question to answer in this context is: did anything like an Indian cartographic tradition exist? In a survey of writings on Indian historical geography, as a part of the Survey of Research in Geography by the Indian Council of Social Science Research (ICSSR) Raza and Ahmad (1972) observe that "there exists no evidence of an indigenous tradition of map making". While this may be a generalised view of geographers, there have been scholars of Indology and Indian history who sought to demonstrate the existence of surveying and the knowledge of cartography in ancient India. Tripathi (1963), in his paper "Survey and Cartography in Ancient India", quoted different ancient texts, especially the *Sulvasutra*, to demonstrate that the art of surveying and cartography was known to Indians. He elaborated his view further in his book "Development of Geographic Knowledge in Ancient India- (Varanasi, 1969), in which a long chapter is on *Survey, Cartography and Cartographic Symbolism*. References to Ancient Indian Cartography also appear in Sircar's "Studies in the Geography of Ancient and Medieval India (1981)". Most of these works and references heavily rely on the idea of measurement and geometrical or other specific forms, as mentioned in the ancient Indian texts. In the opinion of the present author, nothing that is known by way of references of measurements, survey work, or geometrical and astronomical figures and calculations, either from the *Vedic literature* or from other ancient texts, puts us on an unassailable ground to establish the existence of a cartographic tradition in Ancient India definitively.

The views of several Indologists who thought that there existed a tradition of survey and cartography in Ancient India is evaluated by Schwartzberg (1992) in chapter-2, "Introduction to South Asian Cartography", which he contributed to the "History of Cartography", a much larger work containing several volumes. "Schwartzberg, like many others, believes that although there are grounds to suppose that "Indians produced maps for roughly two millennia, before the advent of the Portuguese- and possibly over a considerably longer period, virtually nothing in the way of ancient cartography survives. *"Apart from incised potsherds of the second or first century BC that bear rough plans of a monastery and a few ancient sculptures depicting sacred rivers, there is no extant cartographic or cosmographic of a distinctly Indian stamp that can be unequivocally dated to any date earlier than 1199-1200, the date of a Jain bas-relief representation in stone of the mythical continent Nandisvardvipa which to European eyes would not appear to be a map"*. Yet, more than sixty per cent of the length of the chapter, Schwartzberg talks of Indian antiquaries, starting from Vedic times, including the *Sulava Sutra, the satapatha Brahman, Mahabharata and Ramayan*, and, in the process, invents a new term called "Verbal cartography" Schwartzberg quotes Basham to show that there were measurements of land during the Mauryan period, and Stella Kramrisch to suggest that the old Hindu temples involved advanced planning and measurement according to a plan.

His elaboration of Indian Cartography contains sub-titles like **"THE NATURE OF THE INDIAN CORPUS TEXTUAL SOURCES AND ARCHAEOLOGICAL RECORD,"** wherein he discusses the Harappan Culture, the Vedic sacrificial Altars, and ancient knowledge of Geography and Cosmography, Indian Astronomy, model Architectural Plans, from ancient and medieval India. He reproduces sixteen figures through illustrations, including cave paintings, bas-relief, sketches of sacrificial altars, and a Jaipur plan.

While going through his writing of the traditional Indian cartography, one cannot escape the feeling that he has struggled to collect and include everything he laid his hands on, relating to Vedic rituals, ancient Indian iconography, astronomy, and even cave painting and pieces of bas-relief. For example, the reproduction of Ganga-Yamuna in bas-relief at Udaigiri (Ujjain-MP) as a cartographic work would appear incongruous, if not outright absurd. Similar is the case of rock paintings of Bhim Betka—a place forty km from Bhopal—or Mahararia from Mirzapur in UP, taken from secondary sources and reproduced in the text, could by no stretch of imagination represent a map.

It appears, in his efforts to discover cartographic pieces in India and document all that he discovers by way of non-textual material like pre-historic figures, paintings, bas-relief, the remnant of sketches, or even description that suggests measurements of land, he includes in his enumeration of the corpus of Indian cartographic work.

Cartography in Medieval India

One of the oft-quoted authors and a savant of Medieval India, Ahmad-al- Biruni, though a very distinguished man of letters and familiar with India, wrote *Kitab-al- Hind* besides a history of India - *Tarikh al-Hind*. Elsewhere he compiled a list of places and the distances between them but produced hardly anything that could qualify as a cartographic work.

More to the point are the frequent references to Mughal cartography, especially during emperor Akbar's time, as recounted by a Jesuit, Father Monserate, who recorded the measurement of roads along the marches and quoted the journey of Akbar from Delhi to Kabul. This gave rise to what is referred to as strip maps in the memoir of James Rennel. Some maps- and probably the only ones, of medieval India are found in the edited volume - "*Maps of Mughal India*", an atlas commissioned by Col Jean Baptist Joseph Gentil (1770). These maps were edited and reproduced by Susan Gole (1988), who observed that "For the first time, the map of India was drawn from an indigenous source and showed the political divisions of local administrative units according to local sources, and not from the grabbed account of foreign visitors". With 21 maps, the collection of maps by Gentil is unique as it is a pre-British, but contained maps only of Mughal India. It may be noted that Col. Jean-Baptiste-Joseph Gentil was an agent of the French Government to the court of Shuja-ud-daula at Faizabad for 25 years and was familiar with the Gangetic basin. His maps, therefore, included the *Doab*, the river Ganga, the cities along it and even some parts of the Bay of Bengal coast, from Calcutta to Ganjam.

The Mughal cartography, as an art, has been quoted by Irfan Habib, who emphatically mentioned the existence of a 17th century world atlas contained in a more extensive encyclopaedic work by Sadiq Isfahani of Jaunpur. There is no doubt that the Mughals had an idea of survey and measurement of land and may have produced cadastral maps, but whether they produced large-scale maps of their empire or part of it is questionable. Nevertheless, they knew the routes and distances from which they may have produced route maps.

Cartography under European Tradition

This refers to the maps of India or its regions prepared on a scale by Europeans or others under their direction. In this category, no one gets precedence over James Rennel, a founder member of the Royal Geographical Society. However, in our context, the Surveyor General of the East India Co., starting with the Survey of Ganges for navigation (1764), produced several maps of Bengal, put them together in an atlas, "A Bengal Atlas-1779", and finally produced his most famous cartographic work - "Memoir of a Map of Hindoostan; Or, The Mogul Empire" (1782). This began a long process of surveying and map-making in India. Though not very accurate, Rennel's map of Hindoostan was the first of its kind, drawn on a scale on a network of latitudes and longitudes and carrying a gazetteer at the end that could help future map makers. What is overlooked is the inscription on the title page and the cartouche, an ornamental part in most of the maps of the earlier period. The cartouche in Rennel's map carries a half-tone picture of Britannica with many Brahmans with their sacred books in a posture of subjugation with the following inscription at the bottom- "*Britannia receiving into her protection, the sacred books of the Hindoos, presented by pundits or learned Brahmins: an allusion to the humane interposition of the British legislature in favour of the Natives of Bengal*" in the year 1781. In the cartouche, Britannia is supported by a pedestal engraved on the victories, through which the British nation obtained and has hitherto upheld its influence in India"- a very demeaning statement. One may justifiably ask: Was it a simple map-making exercise or just

"cartography in the service of the empire, " as Dikshit (1998) suggested? This shows what the entire apparatus of East India Co. thought of Indians.

Survey of India

Survey and map making in India under the European tradition is synonymous with the Survey of India. Established in 1767, much of the survey and cartographic work in India on modern lines was started by SOI: and SOI is still the sole Government organisation engaged in survey and cartographic work. The most challenging task accomplished by the Survey of India, way back at the beginning of the 19th century, was the survey of the country by triangulation and fixing of the prime meridian as a reference meridian, as discussed earlier. The survey work started in 1802 and ended in 1871. It may be mentioned that the survey and mapping of India was a pioneer work, and one of the earliest exercises in triangulation and mapping in the world

In passing, one may mention the contribution of India to the triangulation survey. The British Engineers and surveyors trained the Indians in the art of surveying and even trigonometric calculation, especially the surveyors from Bengal. However, the most famous story is that of Nain Singh and his brother, who found the way to, and details of several geographical features of Tibet, including the height of Tibet. Trained at Dehradun for a couple of years to travel incognito, Nain Singh's achievements are the stuff of folklore associated with the Survey of India.

Other Organisations Producing Maps and Atlases

The maps prepared by the Survey of India, like the topographic maps, small-scale maps, atlases, town maps or maps of specific areas, are legion. Maps and map-making in India are virtually synonymous with the Survey of India. India is privileged to have inherited such an organisation with an enormous archive of maps, charts, documents and historical records.

Besides the Survey of India, a couple of other Governmental organisations produce maps and atlases. These include National Atlas and Thematic Mapping Organisation (NATMO). Known earlier as the National Atlas Organisation (NATMO), it was established by the Government of India in the fifties of the last century under the directorship of Professor S. P. Chatterjee. Starting with a modest beginning, the organisation has grown admirably, producing, today, broadly, thematic maps as required by the Government of India. Starting with a general atlas of India on a scale of 1:5,000,000 and subsequently maps of different parts of India on a scale of 1:1,000,000, NATMO now produces maps of different genres- regional, thematic, or even problem-oriented maps. Besides NATMO, the Census of India has started producing excellent thematic maps of languages, tribes or other aspects of the Indian population. The Census of India has an ancient tradition of map-making. Some of the early maps of Bengal carry excellent pieces of cartographic work. Certain states' Directorates of Statistics produce Statistical Atlases containing the latest statistical information. Most Government ministries and departments have their cartographic sections to produce required maps. Lately, some private organisations like "Map My India" have started producing maps under a licence from Survey of India.

The Contribution of Indian Geographers to Cartography

The contribution of Indian Geography to cartography in general, and the cartography of the country, in particular, is manifold. Firstly, they have kept the science of map-making alive. Most universities have courses on surveying, map projection and statistical mapping. Some have contributed by physically producing a set of maps. To start with, "Bengal in Maps", by Professor S.P. Chatterjee, was a unique contribution for its time. A similar effort was made by G. S. Ghosal, who produced an Atlas – "Punjab in Maps". Map and atlas-making exercises got a head start after 1958, after the publication of the Regional Planning Atlas of Mysore by ATA Learmonth and L. S. Bhatt. Though a

sponsored project of the Planning Commission, the latter paved the way for several subsequent Planning atlases like Manzoor Alam's Planning Atlas of Andhra Pradesh, followed by a Planning Atlas of Uttar Pradesh by L. R. Singh. During the last quarter of the last century, a few thematic Atlases were produced by geographers. The Tribal Atlas of India by Moonis Raza and Aijazuddin Ahmad, the Atlas of Women and Children by Saraswati Raju and the Atlas of Chandigarh by Gopal Krishan readily come to mind. However, the Historical Atlas of India and Pakistan by Joseph Schwartzberg is a world apart.

Nevertheless, it is a cartographic *piece de resistance*. Some publishers, notably Oxford University Press, have produced a few India-centric atlases. Besides the Oxford School Atlas, which has gone into multiple editions: they also produced an Economic Atlas of India and, lately, the Oxford Reference Atlas. Going beyond its traditional brief, the Survey of India, under the directorship of Dr Prithvish Nag, has produced a series of District Planning Maps of a large number of districts of India on a scale of 1:250,000. These large-scale planning maps make a good starting point to have one familiarised with any region.

Contemporary Works on the History of Cartography

In this context, mentioning a couple of works on the History of Cartography is essential. The three authors that must be acknowledged are Professor Joseph Schwartzberg, the celebrated author of "Historical Atlas of India", Susan Gole, and Manosi Lahiri, the last, a hard-core geographer and cartographer. All three have contributed to the History of Indian cartography in their ways. While Schwartzberg wrote several articles for the History of Cartography Project, Gole and Lahiri produced a collection of Indian maps from the archives and made them available to those interested in Indian maps. Gole started with "Early Maps of India" (1983), followed by a companion volume "India within the Ganges", consisting of a series of early printed maps of India in facsimile and the edited volume of the "Maps of Mughal India" drawn by Col. Jean Baptiste-Joseph Gentil, referred to earlier. The most well-known work of Gole is her - "Indian Maps and Plans- from Earliest Maps to "(1983), followed by a companion volume "India within the Ganges", consisting of a series of early printed maps of India in facsimile and the edited volume of the "Maps of Mughal India" drawn by Col. Jean Baptiste-Joseph Gentil, referred to earlier. The most well-known work of Gole is her "*Indian Maps and Plans - from Earliest Maps to the Advent of European Survey*". Gole could find and put this collection of all the maps and plans in a volume. Manosi Lahiri (2012) - "Mapping India" is a collection of 160 annotated coloured maps. Running 320 pages, the book, more like an atlas, could be considered the latest addition to the History of Indian cartography.

Where is Indian Cartography?

There is no breed of professionals in India called cartographers. In some countries, there is a class of qualified, trained cartographers called "Cartographer Engineer", and university departments and other Government organisations hire these cartographers. No university in India, to my knowledge, offers a course leading to a degree or diploma in cartography. The second most important point is that India does not produce maps of any other continent or country or a world atlas of some merit besides its own. The country depends on international publishers, like Oxford, Phillips or others, for an atlas. Nor does the country produce medium-scale maps (1:200,000 or 1: 1,500,000) of different countries or parts of the world. The most readily available map of any part of the world is the million sheets of international series on a 1:1,000,000 scale. Whatever the past achievements or non-achievements of Indian Cartography, the state of map-making in India today is a sad commentary on contemporary Indian cartography. What is needed is a revival of cartography on modern lines by establishing a multi-functional Institute of cartography to preserve past cartographic works from all possible sources, train a band of cartographers on scientific lines and produce maps of all parts of the world, including India.

Contemporary Cartography in India

Besides the Survey of India, the country's premier producer and keeper of maps, the most visible cartographic organisation in India is the Indian National Cartographic Association. It holds annual conferences, often hosted by some geography departments or other Indian universities. If one exists, finding a cartography department in any university in India is not easy. To question if there are any acclaimed cartographers in India may bring a negative answer. What has been known for a long is the interest and profession of geographers as makers and users of maps. Map-making has been integral to geographical teaching in Indian colleges and universities. Unfortunately, with the advent of Remote Sensing and Geographical Information Systems, the actual map-making has receded in the background. Copying, often from unauthorised sources, digitising and use of available software have made map-making exercises redundant.

Google's over-arching reach

The appearance of Google Maps has charmed and stunned every user of maps. On needing a map, one turns to Google, not some atlas with a gazetteer or a topographical sheet. To be fair to Google, a private entrepreneurial enterprise, it has done tremendous work not only as a search engine but also by producing Google Earth with multiple layers of information and building built-in programmes for scale adjustments, carrying some basic information that pops up the moment you touch a location on the map. These maps have packed in so much data usually unavailable from a simple map. Distances, heights, and relief profiles are integrated into a Google map. The fallout is that with a laptop or a smartphone, one can scan enough information about a place or a region. A person with a smartphone will tell the coordinates, the height, distances and many other details in a few seconds, whereas in an atlas, one has to look at the gazetteer, given at the end, to know the coordinates, estimate the height with the help of the nearest contour, or measure distances on the map by using the scale. Google has integrated software in Google Maps that do these simple jobs at electrifying speed.

However, these devices or facilities represent only a part of the entire gamut of cartographic work. It must be remembered that Google has utilised survey maps, topographical sheets, atlases, and other details for identification, processed them, subjecting them to software that produces multilayered maps, which are handy. The satellite images are their own or obtained from national agencies, but other details, especially the identification of ground features, must have been obtained from some maps. For example, how would Google know the name of a village, say Chak -179, in Punjab from a satellite? In such cases, these agencies have to depend on secondary sources. It is hard to imagine that Google has employed human resources to cover the entire face of the earth, survey, and complete the identification exercise. How would the satellites know the names of the ground features? Again, these must have been borrowed from secondary sources, regional, local or city maps, or done through human resources identifying and inscribing names.

Secondly, Google's achievements do not make our country proud. That is the success story of a Commercial enterprise with its base in the USA. Google borrows heavily on the centuries of accumulated work of engineers, surveyors and cartographers to collect information, process it and present it to us as a ready MENU to be used freely by anyone. The country and its geographers have not produced a standard geographical atlas, nor is there any publishing house of Indian origin that has undertaken this specialised task of map and atlas making. Oxford, for long specialised in atlas making, is still the best producer of atlases. Their school atlas, for a modest price of Rs 150/-, is the best in its class.

The fact is that though the Government of India is very strict about adhering to a pre-established authenticated international boundary, cartography, as an art and science, has suffered complete neglect. Therefore, the Government of India must think of an Institute of Cartography to train and prepare cartographers trained in all aspects of cartography.

In light of the above discussion, one may pose a few questions:

1. Is GIS and Remote sensing a substitute for cartography?
2. Can we do away with the Science and Art (the aesthetics involved) of cartography?
3. Is it not the function of cartography or cartographers to produce good maps and atlases, thematic and topographic, taking necessary inputs from GIS and Remote Sensing?
4. Why have Indian cartographers, including those specialised in GIS and Remote Sensing, not produced a District, State and Country atlas of the mountainous and highly inaccessible areas by applying the knowledge of GIS and Remote Sensing?
5. I believe cartography is the Art and Science of map making, and GIS and Remote Sensing are the scientific tools for spatial analysis.
6. Let the scholars, especially geographers, who have been traditional makers and users of maps, produce some maps and atlases of our country or any part of the world, using their expertise. Let cartography not disappear from the scene altogether.
7. The freely available geo-platform of 'Google' with layers of details at different scales for consultation is neither our creation nor can these be printed as an atlas, which is akin to plagiarism and may be interpreted as an infringement of Copy Right Act. Also, as mentioned above, Google is not an Indian creation.
8. The 'Bhuvan' Geo-platform, made thankfully available by ISRO, is some consolation. However, it hardly compares with the quality of Google. Besides having limited coverage, unlike Google, which has a global reach. The main question, however, remains: Does it eliminate the need for map-making? If the maps produced in the Indian research journal are any guide, I dare observe that a large number of Indian geographers, if not all, shabbily adopt the spatial details from Google or somewhere else. These maps lack clarity.
9. Those interested in map-making may seriously consider an Institute of Cartography, as mentioned above.

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THE CONTRIBUTORS

Himadri Banerjee, Formerly Guru Nanak Professor of Indian History, Jadavpur University, Kolkata.
Email:hbjadavpur@gmail.com

Nivedita Paul, Senior Research Fellow at the Centre for the Study of Regional Development, School of Social Science, Jawaharlal Nehru University, New Delhi.Email:nivedita.paul26@gmail.com

Bhaswati Das, Faculty, Centre for the Study of Regional Development, School of Social Science, Jawaharlal Nehru University, NewDelhi. Email: bhaswati2004@gmail.com

Mohit Kesarwani, Department of Natural and Applied Sciences, TERI School of Advanced Studies, New Delhi-110070

Bhawna Bali, Department of Sustainable Engineering, TERI School of Advanced Studies, New Delhi- 110070

Neeti Neeti, Centre for Climate Change and Sustainability, Azim Premji University, Bangalore - 562125

Benoit Parmentier, Geography Department, University of Mary and Washington; Mitchel Center for Sustainability Solutions, University of Maine.

Puran Chand, ICSSR Post-Doctoral Fellow, Department of Geography, HP University, Summerhill, Shimla Email: pooranc24@gmail.com

B.R. Thakur, Chairman & Associate Professor, Department of Geography, HP University, Summerhill, Shimla. Email: brthakur53@gmail.com

Shovan Ghosh, Associate Professor, Department of Geography, Diamond Harbour Women's University, Sarisha, South 24 Parganas, West Bengal, India. Email:ghoshshovan.dhwu@gmail.com

Ananya Kayal, Research Scholar, Department of Geography, Diamond Harbour Women's University, Sarisha, South 24 Parganas, West Bengal, India. Email: kananya938@gmail.com

Sramana Maiti, Research Scholar, Department of Geography, Diamond Harbour Women's University, India.Email: maitisramana.94@gmail.com

Shovan Ghosh, Associate Professor, Department of Geography, Diamond Harbour Women's University,Sarisha, South 24 Parganas, West Bengal, India.Email:ghoshshovan.dhwu@gmail.com

K.C. Lamalsawmzauvauva, Assistant Professor, Department of Geography & Resource Management, Mizoram University, Email:mzuta154@mzu.edu.in

Samuel R.Vanlalruata, Assistant Professor, Department of Geography, Hnanthial Govt. College, Mizoram.

Gopa Samanta, Professor of Geography, The University of Burdwan, PIN- 713104, India. Email:gsamanta@geo.buruniv.ac.in

K. R. Dikshit, Formerly Professor of Geography, Savitribai Phule Pune University, Pune, Maharashtra. Email:krdikt@gmail.com

REVIEWERS OF THE PAPERS

A.C.Mohapatra, Formerly Professor of Geography, North-East Hill University, Shillong. Email: acmohapatradr@gmail.com

Bhupinder Singh Marh, Formerly Professor and Chairperson, Department of Geography, Himachal Pradesh University, Shimla-175001, Email: bs_marh@yahoo.co.in

Krishna Mohan, Professor and CAS Coordinator, Department of Geography, Panjab University, Chandigarh-160014, Email:krishnamohan291967@gmail.com

Madhav Shyam, Former Deputy Director, Directorate of Census Operations, Punjab, Chandigarh-160019, Email:madhavshyam1312@yahoo.com

Mehar Singh, Formerly Teacher-cum-Map Curator, Department of Geography, Panjab University, Chandigarh-160 014, Email:mehar.s49@gamil.com

Nina Singh, Formerly Professor of Geography and Dean Academic Affairs, Maharshi Dayanand University, Rohtak-124001, Haryana, Email: ninasingh99@gmail.com

Pawan Kumar Sharma, Associate Professor, Centre for Research in Rural and Industrial Development (CRRID), Chandigarh-160019, Email:pawanpks19@gmail.com

P.S. Tiwari, Formerly Professor of Geography, University of Madras, Chennai-600005, Email:tiwarips@hotmail.com

Ripudaman Singh, Professor of Geography, School of Social Sciences and Languages, Lovely Professional University, Phagwara (Jalandhar), Email:ripudaman1@hotmail.com

Shrikamal Sharma, Formerly Professor of Geography, Dr H. S. Gour University, Sagar (M.P.) 470003, Email ID: shrikamal.sharma@rediffmail.com

Sodhi Ram, Formerly Professor of Geography, University School of Open Learning, Panjab University, Chandigarh-160014, Email:sodhiram@hotmail.com

Srikumar Chattopadhyay, Principal Scientist (Retd.), Centre for Earth System Sciences(CESS), Thiruvananthapuram, Email:srikumarc53@gmail.com

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Corresponding Author