International Journal of Social and Administrative Sciences
ISSN(e): 2521-0556
DOI: 10.55493/5051.v9i2.5216
Vol. 9, No. 2, 39-63.

URL: www.aessweb.com

Aging population in urban India: Challenges and insights from Kolkata

Sreelekha Mazumder[1+]
Rajib Shaw[2]

[1,2]*Graduate School of Media and Governance, Keio University, 5322 Endo, Fujisawa, Kanagawa 252-0882, Japan.*
[1]*Email: shaw@sfc.keio.ac.jp*
[2]*Email: mazumder.sreelekha99@gmail.com*

(+ Corresponding author)

Article History
Received: 28 August 2024
Revised: 10 October 2024
Accepted: 21 October 2024
Published: 4 November 2024

Keywords
Aging population
Healthcare
India
Kolkata
Old age home
Social innovation.

ABSTRACT

In Kolkata, the elderly people represent 11.76% of the total population. Here we present new data on the aging population of Kolkata, and address its causes, and consequences. We interviewed 110 elderly male and female who are living with their family members and in old age homes in Kolkata. The data was collected from low, medium, and high-income groups from three urban housing societies as well as five old age homes. It has been observed that the elderly male and female of the low-income group have no medical and life insurance, and many of them are suffering from health issues. Although females up to 60 years are part of Self-Help Group, males are suffering from Loneliness. The elderly male and female of the medium, and high-income group do not have financial issues, but most of them do not visit doctors and health care centers for regular health check-ups. Digital literacy has to be improved. Elderly people staying in old age homes are mentally and physically much better than their counterparts who live with family members. Analysis of existing government policies reveal scope for improvement of the elderly people. We propose social innovation for the elderly population in Kolkata.

Contribution/ Originality: Research on elderly people in Kolkata is very limited. We interviewed elderly people from all income groups residing with their family members and old age homes in Kolkata. We have analyzed their problems gender wisely and recommended social innovations belonging to different income groups for the first time in Kolkata.

1. INTRODUCTION

Population aging has now become a global phenomenon. The number of elderly people is increasing rapidly in developed countries (e.g. Japan, USA) as well as in developing countries like India. Currently the older population (defined as people who are 60 years and above in India, United Nations (2019)) of India is 140 million and India is aging rapidly (Bloom, Sekher, & Lee, 2021; M.K. Shankardass, 2020; M. K. Shankardass, 2021) and references therein; (Srivastava & Nandita, 2022). It is anticipated that the proportion of India's population will more than double, from 9% in 2015 to 19% in 2050 (Bloom et al., 2021; United Nations, 2019; World Health Organization (WHO), 2022). The older population of India will be then 320 million, almost equal to the entire (current) population of the USA (Bloom et al., 2021). According to Census 2021, the number of elderly females will exceed elderly males (71 million females and 67 million males) by 2031 (Chauhan, Mohanty, & Mishra, 2019; Mohanty, Mishra, & Chauhan, 2019). West Bengal, Himachal Pradesh, Punjab, and Maharashtra are the states that are already witnessing an aging phenomenon in India (Ahmad & Saxena, 2023).

We have conducted our research in Kolkata which was the capital of India before Independence. Kolkata is a Metropolitan city in West Bengal where number of aging people is growing fast where some studies have been undertaken which are rudimentary, not systematic, and sampling was largely random (Bhattacharyya, 2017; Gangopadhyay, 2020; Kurian, Roy, Chopra, Ghosh, & Da, 2023). Although it is known that quality of life in a family set up and at an old age home setup are generally different in rural set up (Morell, De, Johansson, & Gustafsson, 2024; Panday, Kiran, Srivastava, & Kumar, 2015) effort to compare quality of life of the elderly people (male versus female) in a family set up and at old age home set up in a Metropolitan city like Kolkata is very limited. Moreover, problems are different in different income groups.

Earlier researchers largely focused on the negative aspects of population aging such as low labor participation and excessive social expenditure (Bloom, Canning, & Fink, 2010) references therein). The incapability of the aging population to provide physical labor does not underscore their productivity. Competent and experienced elderly people with emotional force can unite people and thus help in social networking. In fact, world-wide have promoted "Graceful Aging." (Ekwonye et al., 2023; Mathuranath, 2005; Roy, Kumar, Kumar, Sati, & Dhar, 2024). The World Health Organization (WHO) named this as "Active aging" (or healthy aging, see Alice (2024)). Active ageing involves economic and non-economic activities (Foster & Walker, 2015). In contrast, productive ageing includes only economic activities (Foster & Walker, 2021). Successful ageing encompasses both active as well as productive ageing (Irshad, Lekha, Azeez, & Rajan, 2023) their Figure 2). Successful ageing is a multidimensional research field that combines a number of biological, psychological, and sociological factors (Annele, Satu, & Timo, 2019; Gopinath, Kifley, Flood, & Mitchell, 2018; Teater & Chonody, 2020). Although some statistical investigation has been undertaken recently in India (Irshad et al., 2023) sociological aspects of successful aging are not adequately addressed. Most of the studies are conducted by medicine practitioners from a largely healthcare point of view without considering the sociological and economic factors. The successful aspects of aging were not considered. No systematic and comparative studies have been undertaken to understand the aging issues between elderly male and female in Kolkata. No effort has been made to recommend social innovation for elderly people of different income groups.

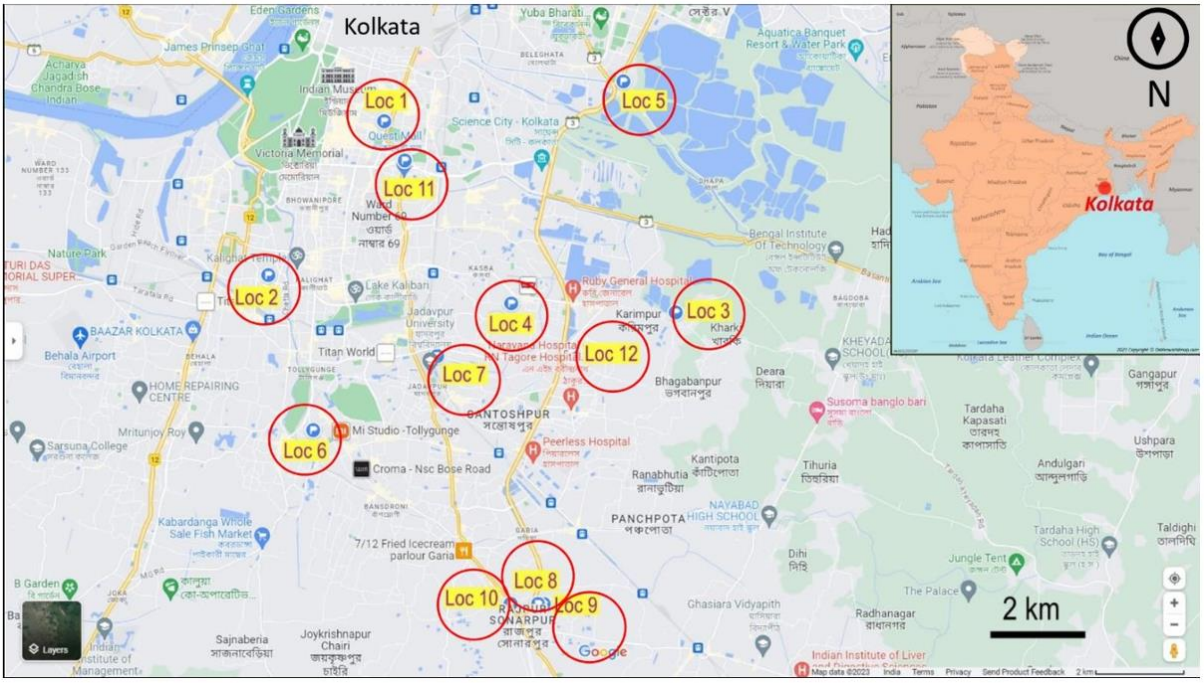

Figure 1. Map (Google Earth image) showing the study locations at Kolkata. Map of India with location of Kolkata in inset.

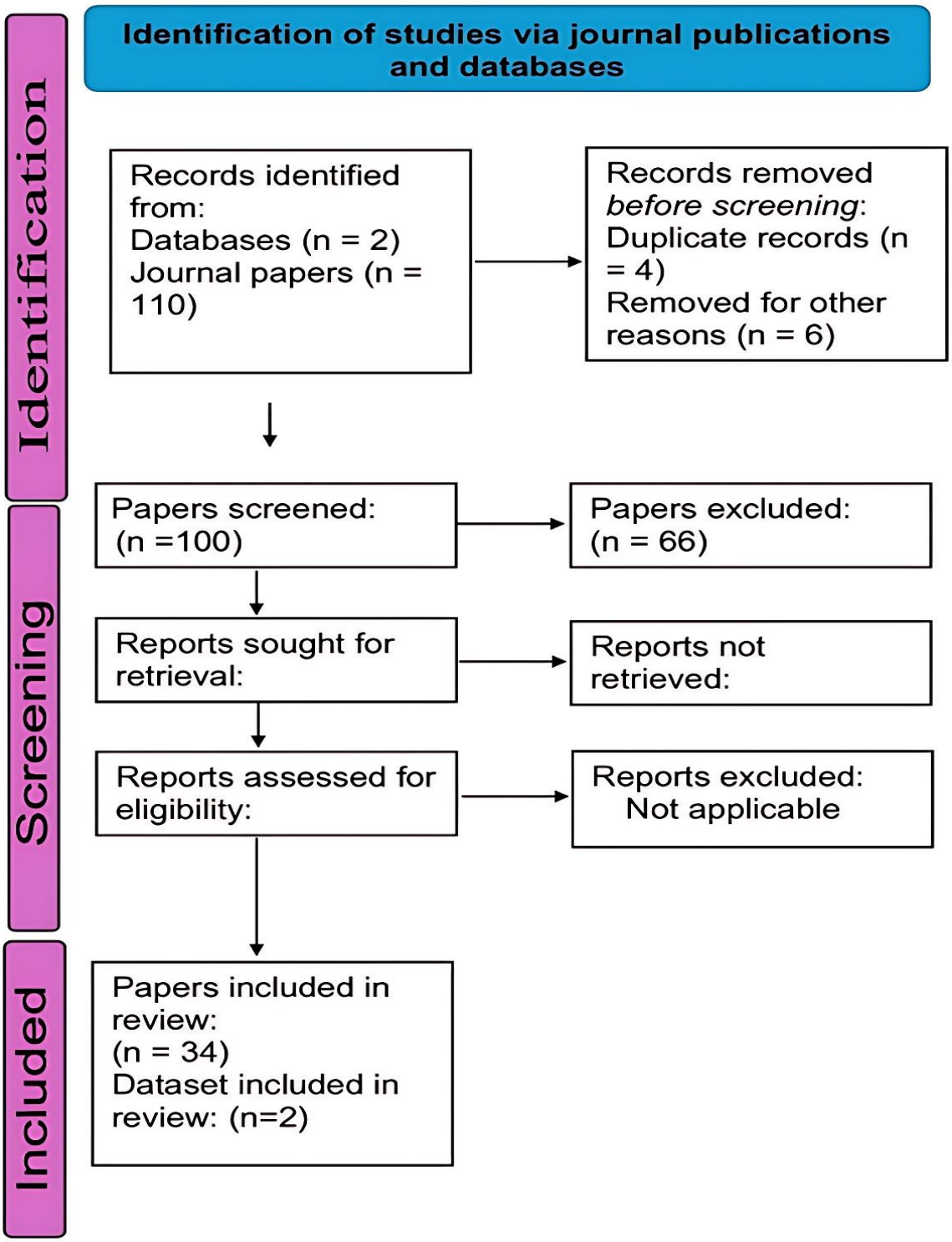

Figure 2. PRISMA flow chart showing details of literature review.
Source: Page, McKenzie, and Bossuyt (2021).

In this paper, we have reviewed previous investigations in Kolkata (Figure 1), highlighting the problems of elderly people in family set up and at old age homes based on our new data. We have compared our data with similar published data from other metropolitan cities of India. systematic analysis of aging population in Kolkata was done largely from healthcare perspective without emphasizing socio-economic aspects of aging population. Therefore, our data and statistical analysis of data collected from different economic groups and different UHS, private as well as government and NGO operated old age homes is significant. In addition, we have considered the positive aspects of aging and suggested social innovation for elderly male and female belonging to different income groups. Finally, we

have recommended some social innovations to solve some of these problems that may encourage to undertake new research on graceful and active aging in Kolkata and other cities in India.

2. AN OVERVIEW OF PREVIOUS RESEARCH

Previous researchers studied some health as well as social problems of the aged people in India. These studies are largely conducted in urban areas and by Institutions (Lena, Ashok, Padma, Kamath, & Kamath, 2009; Pandve & Deshmukh, 2010; Prakash, Choudhary, & Singh, 2004; Thakur, Banerjee, & Nikumb, 2013). In some cases, such investigations have also been conducted by family physicians (Bhattacharyya, 2017). Panday et al. (2015) conducted a comparative study of quality of life among elderly people living with family and living in old age homes. The study was conducted at two old age homes and two areas of Ranchi - Kantatoli and Kanke, Jharkhand and involved 80 elderly people (40 elderly people from old age home and 40 from family set up; see Panday et al. (2015)). It has been observed that the physical and mental health of the elderly people living in old age homes is better than their counterparts living with family. In contrast, social health was better for those who were living with family setup. As pointed out by Bhattacharyya (2017) largely middle-class people share not only their health issues but also their personal, socio-economic, and psychological problems with their family physicians. Therefore, the data collected by the family physicians are genuine and more authentic. Several studies have been undertaken on health care utilization among elderly Indians (Kundu, Bharadwaz, Kundu, & Bansod, 2022) gender discrimination in health care expenditure (Mondal & Dubey, 2020) influence of changing lifestyle on the physical illness and unhappiness among the elderly people in India (Adhikari, 2015). It is important to note that physical and mental health issues are as important as various socio-economic issues. Therefore, a holistic approach is essential to investigate issues related to the aging population of urban India.

Bincy, Logaraj, and Anantharaman (2022) and Irshad et al. (2023) have undertaken detailed investigation of population aging in India. Bincy et al. (2022) interviewed 1000 elderly people (men as well as women from urban as well as in rural area) in Chennai, Tamil Nadu. Results indicate that 29.9% of the participants have good social network whereas balance 70.1% have poor social network. In rural setting illiterate were socially connected. However, literate elderly were more socially connected in urban settings. Bincy et al. (2022) have shown that elderly people who have poor social network are sufferring from depression, stress, poor health status, and poor quality of life. Although these authors suggested innovative approaches to be undertaken by the government to strengthen the social network of elderly people, no specific plan (social innovation) has been recommended (Bincy et al., 2022).

Irshad et al. (2023) have examined the Longitudinal Ageing Study in India (LASI) Wave–1 (2017–2018) dataset (7837 aging Indian male and female) and undertook in depth statistical analysis. The data was collected from all Indian states (excluding Sikkim). It has been found that inactive ageing was higher among the Indian ageing population (57.47%). This is followed by active ageing (29.59%) and productive ageing (12.94%) (Irshad et al., 2023) their Figure 4). Poor sleep quality and the prevalence of morbidity and disability among the Indian ageing population are the main factors that inhibits to attain active and productive ageing. In contrast to the urban aging population, the rural aging adults were more likely to attain active ageing than productive ageing. These authors have studied gender wise variation in different types of aging (Irshad et al., 2023) their Figure 6). However, it is unclear whether there is regional (i.e. state wise) variation of different kinds of aging as the study uses aging population data from all states of India. Roy et al. (2024) undertook a regional comparison of aging population of India and its implications for welfare and healthcare infrastructure.

In West Bengal, in depth study on aging population is very limited (Adhikari, 2015; Bhattacharyya, 2017; Gangopadhyay, 2020; Kurian et al., 2023). In Kolkata, the number of elderly people is 11.76% of the total population. This is the highest percentage of elderly people among the metropolitan cities of India (Kurian et al., 2023) their Table 4). Adhikari (2015) conducted a survey of 100 elderly people (75 men and 25 women aged 60-70 years) in south Kolkata. It has been found that 85% of those elderly people were sufferring from lifestyle-related diseases (heart

diseases, hypertension, diabetes, high blood pressure etc.). In addition, 78% of the elderly people had issues with physical mobility and mental illness. It has been observed that 68% of the elderly people are either staying alone or with conjugal partners with poor social network. As a consequence, they adopt a style of unhealthy living (Adhikari, 2015). This is an interesting study, but the author did not present detailed information. Bhattacharyya (2017) a family physician, conducted a community-based cross-sectional study in Kolkata. He interviewed 208 elderly patients (male as well as female). Multiple morbidities are common in most of the patients (87.98%). Among multiple morbidities, Visual impairment was most common (75.96%) followed by prevalence of hypertension (68.75%). Regular health check-up for elderly people, which is the responsibility for individual, family, society, and the government (Bhattacharyya, 2017). This investigation is largely concerned with physical and mental health. Socio-economic aspects of population aging were not discussed. The quality of life of elderly people and associated factors in Singur, West Bengal has been investigated by Dasgupta, Pan, Paul, Bandopadhyay, and Mandal (2018). They interviewed 146 elderly people. 54.1% of the elderly people had a poor quality of life. A large proportion of elderly people have issues with the dimensions of pain or discomfort and anxiety or sadness (Dasgupta et al., 2018). Kurian et al. (2023) chosen 83 elderly people from Kolkata to investigate their problems. According to these authors, loneliness is one of the major problems among the elderly people in Kolkata. Social isolation is becoming increasingly important, which is the main reason for loneliness. Other major issues reported by them are addictive habits, lack of emotional support and financial dependency (Kurian et al., 2023). A large number of elderly people do not have access to government support schemes.

2.1. Research Gaps

India, with its rich traditions and stronger family bonds compared to other countries, is undergoing a significant demographic shift marked by a growing ageing population. The Indian government has introduced several initiatives (discussed later) to address the unique healthcare requirements of older citizens. In spite of s a cultural significance of intergenerational living, most of the ageing people in India prefer to stay with their family members. While family support remains integral, there's a noticeable surge in demand for professional elder care services in India. Elderly people from different income groups are either staying with their family members or residing in old age homes (OAH).

In navigating elder care, India traditionally relies on a "*family-centric*" model. The government supported as well as private OAHs are trying their best to follow this family centric model. This has been observed during field work and data collection in Kolkata as part of this research. However, there are several aspects that need closer scrutiny. The following research gaps have been identified from the literature review:

1. Comparative studies of ageing problems in different income groups and between the residents of the urban housing societies (UHS) and old age homes (OAH) are very limited in India, particularly in Kolkata. Most of the investigations were undertaken on the residents of UHS. Elderly people of the OAH received very little attention.
2. Compared to the socio-economic and physical health issues, the mental health issues of the elderly people and their causes attracted less attention. It has been pointed out that elderly people often develop an unhealthy lifestyle because they are socially isolated. No effort has yet been made to investigate social isolation and mental health aspects of population ageing.
3. Many investigations on elderly people in Kolkata are undertaken by medical practitioners and the emphasis is largely on healthcare. They have access to some relevant sociodemographic data as part of their routine investigations. Research on the ageing issues of Kolkata elderly people from a sociological viewpoint is very limited.
4. Most of the studies discuss the negative aspects of ageing. The positive aspects of ageing (like active ageing or productive ageing) were not highlighted.

5. Although most of the elderly women are part of Self-Help Group (SHG), there is no such effort to engage the elderly men. The maximum age limit to participate in the SHG is 60. Thus, elderly women who are older than 60, cannot participate in it.

3. RESEARCH METHODOLOGY

The key methodology used in the study are as follows: 1) Literature review and policy analysis, 2) Field observation, and 3) Questionnaires and key informal interviews and surveys.

3.1. Literature Review and Policy Analysis

An extensive literature review has been done using engines like Google Scholar and social networks like Research Gates and Academia. The searching has been done using some specific keywords like *aging population*, *Kolkata*, *India*, *social innovation*, *healthcare*, *and old age home*. A total of 110 papers were downloaded, and 2 databases were searched. A total of 10 papers were removed before screening because of duplication or unrelated to the topic. 100 papers were screened. After screening, 34 research papers were finally selected for literature review. 66 papers were excluded and the reasons for exclusion are (1) case studies from developed countries, (2) non-peer-reviewed publications or abstract. A PRISMA flow chart (Figure 2) is prepared following the technique of Page et al. (2021).

3.2. Field Observations

Data was collected from urban areas of Kolkata, India (Figure 1) through structured interviews. Following aspects were considered during the interviews: sociodemographic details (age, sex, marital status, source of income, living arrangements, whether have health and life insurance, whether staying with family or live in old age home), self-reported medical information (chief complaint, past history, personal history, and family history), physical as well as mental health condition, social problems and whether received support during the covid 19 pandemic.

Table 1. Grouping of elderly people based on income and gender (n=110); see Tables 2-4 for details.

No.	Income group	Total no. of person	M	F	No. of sampling locations
1	HIG/MIG	23	12	11	3
2	LIG	43	17	26	2
3	OAH	44	7	37	5

Table 2. Summary of data collected from MIG/HIG) (N=23).

MIG/HIG	Name	No of person	M	F	Age group 60-70	Age group 71-80	Age group 81-90
1	Ujjala apartment	13	7	6	4	7	2
2	Lokenath bhaban	6	3	3	6	0	0
3	Srijan-ozone	4	2	2	4	0	0

Table 3. Summary of data collected from LIG (N=43).

Lig	Name	No of person	M	F	Age group 60-70	Age group 71-80	Age group 81-90
1	Councellor office dakhin kumrokhali 700103	29	10	19	25	4	0
2	Kalyan asram, chetla	14	7	7	9	5	0

Table 4. Summary of data collected from OAH (N=44).

OAH	Name	No. of person	Male	Female
1	All bengal women association	14	0	14
2	Kalyan asram, chetla	7	0	7
3	Ramthakur briddhabash	16	7	9
4	Kasba devine foundation	4	0	4
5	Asha neeketan	3	0	3

A total 110 elderly residents (36 Male, 74 Female) (unbiased selection) were interviewed from three urban housing societies (UHS), five old age homes (OAH), and local Municipality offices (Tables 1-4). We have discussed various issues that elderly people in Kolkata are facing with three experts in their offices. Many Non-Governmental Organizations (NGO) and old age homes (Mother Teressa, Nabaneer, Sabuj Sangha etc.) did not allow us to interview with their elderly residents. Paripurnata (Near Peerless Hospital, Kolkata) asked for donation for interviewing their residents that we could not afford. Elderly people were grouped based on their income and gender (Table 1 and Figure 3). The UHS elderly people belong to the Medium-Income Group (MIG) and High-Income Group (HIG). Elderly people interviewed at Municipality belong to the Low-Income Group (LIG). Some elderly people belonging to the LIG were interviewed in a clinic attached to an OAH (Kalyan Ashram, Chetla, location 2; see Figure 1).

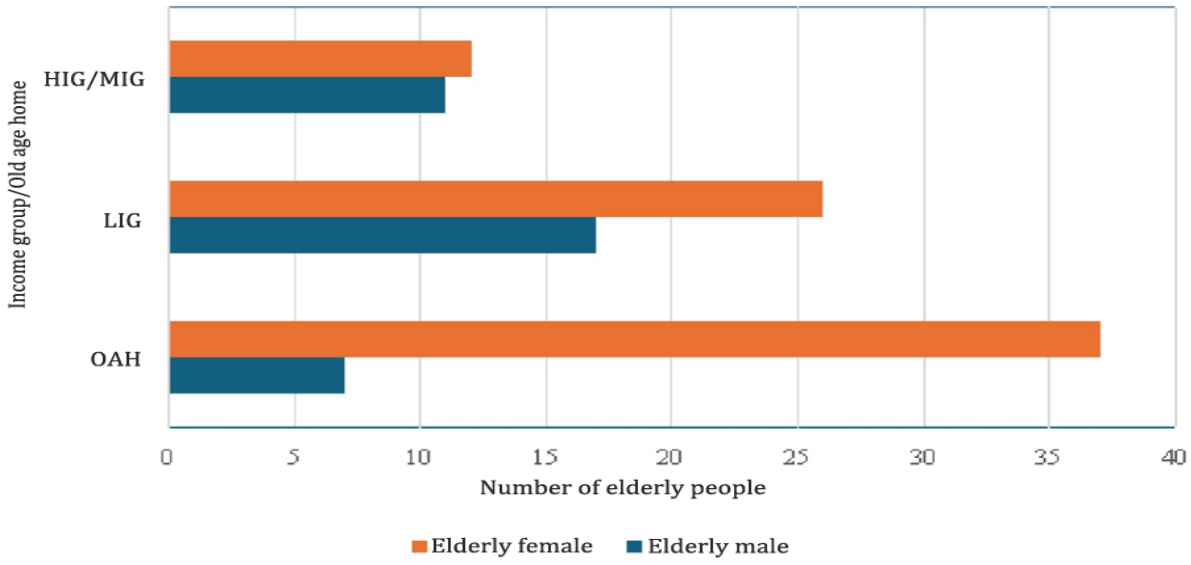

Figure 3. Gender grouping of elderly people in various income groups and old age homes.
Note: LIG=Low Income Group; HIG=High Income Group; OAH=Old age homes.

The data was collected in an unbiassed way and is entirely based on the availability of elderly people. We contacted many housing societies from Japan and during field work but got responses from only three UHS (Table 2). Although we contacted eight NGO who operate old age homes (OAH) in Kolkata and adjoining areas, five OAHs favorably considered our request and allowed their residents for interview. In Kolkata there are old age homes like Sneha Diya (multiple branches) for the elite elderly people (including the Non-residential Indians). But they did not allow us to interview their residents.

3.3. Questionaries and Key Informal Interviews and Surveys

Self-constructed questionnaires were used during the interview. Two different sets of questionaries were used in the interviews. Interviews with individual elderly residents were conducted based on one set of questionnaires whereas interviews with NGO and local municipalities officials were conducted based on a different questionnaire.

4. FIELDWORK AND DATA COLLECTION

4.1. Study Locations

Field work was conducted in twelve locations in Kolkata city. Before data collection, I personally met (1) local MLA at her Narendrapur office (2) officer Mr. Saumitro Chakraborty at Rajpur-Sonarpur Municipality at Garia, Mahamayatala, (3) Dr. Indrani Chakraborty, (gerantologist) at her Salt Lake office, (4) Personnel department of All Bengal Women's Association, Pak Circus, Kolkata, (5) Mrs. Sharmila Majumder, Help Age India at her Moulali (Kolkata) office for discussions and arrangement for personal interviews. The date and time of interviews were arranged by those officers and their respective departments. As per the agreement with Help Age India, names of their elderly residents (Kalyan Asram, Chetla, Kolkata) are kept confidential.

Most of the LIG residents speak only Bengali with rural ascent. Hence a number of interviews were also recorded on smartphones and local counsellor office staff helped to translate into English. The data collected using the questionnaire forms during the interviews was recorded first on paper. Subsequently a Microsoft excel file was created and all data was transferred. For each income group, a separate excel sheet was created. Graphs were prepared in Excel by selecting relevant data in different rows and columns. The data was also summarized in tables (Tables 1-4) prepared in Microsoft Word.

4.2. Interviews

We interviewed elderly Male and Female who are living with their family members as well as elderly people living in old age homes. I have noted major field observations in three different categories 1. HIG/MIG (from the UHSs) 2. LIG, and 3. OAH elderly residents. The data is presented in the next section (Figures 4-8).

5. DATA ANALYSIS

We have critically analyzed the observations made during the interview. We compared elderly male and female in each income group who are staying in UHS (HIG and/or MIG; Figure 4), rural areas (LIG) with their family members, and those who are residents of OAHs.

5.1. Grouping According to Income and Gender

In contrast to the elderly people staying with family or alone (with support from care givers or distant relatives), female elderly people dominate in the OAHs (Figure 4). This is largely due to the early marriage of the female participants and longer life span. After the death of their husbands, they shifted to old age homes. Financial dependency of the elderly women on their children and relatives is one of the reasons for this. Elderly widowers, who retired long ago, still live as part of the family because of their financial independence, and the financial and/or mental support they provide for their children and grandchildren.

5.2. Urban Housing Societies (UHS)

A critical analysis of the data obtained from the medium (MIG) to high income group (HIG) elderly people living in UHS (Table 2) reveals following points: i) Most of the residents are senior citizens and their children are staying in other Metropolitan cities of India and abroad. ii) Health issues are major concerns; many of them do not consult doctor regularly or do not go for regular health checkups (Figures 4-5). There are requirements/scope for improving physical as well as mental health. iii) None of the people interviewed has financial issues. iv) Majority of the residents are highly qualified/educated/retired Professors and staying with other family members. v) The area under consideration is very well connected with other parts of Kolkata and there is no need for improvement in the transportation sector. vi) Most of the residents have health/life Insurance (Figure 5).

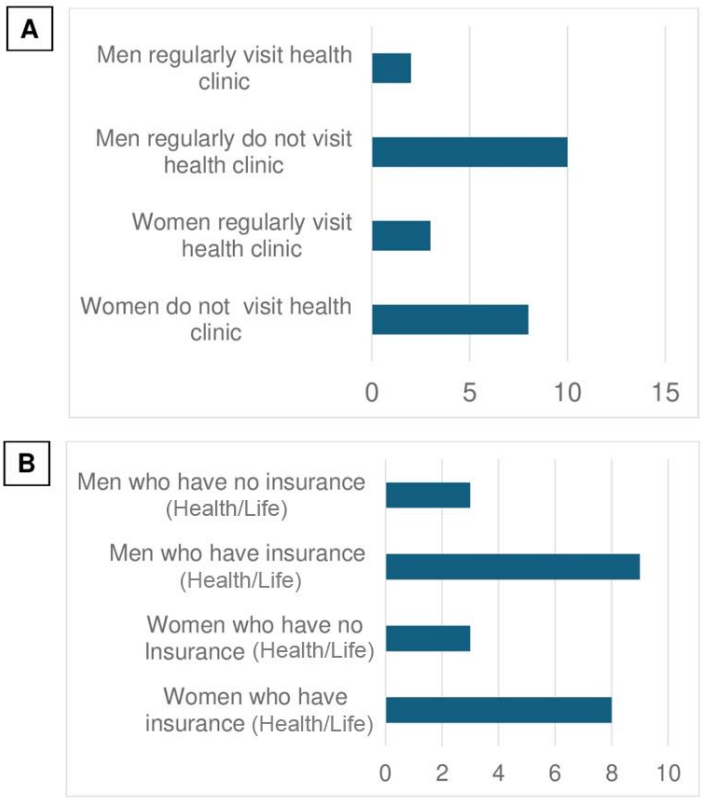

Figure 4. Mental (A) and physical (B) fitness of elderly people in MIG/HIG.
Note: See Table 5 for details.

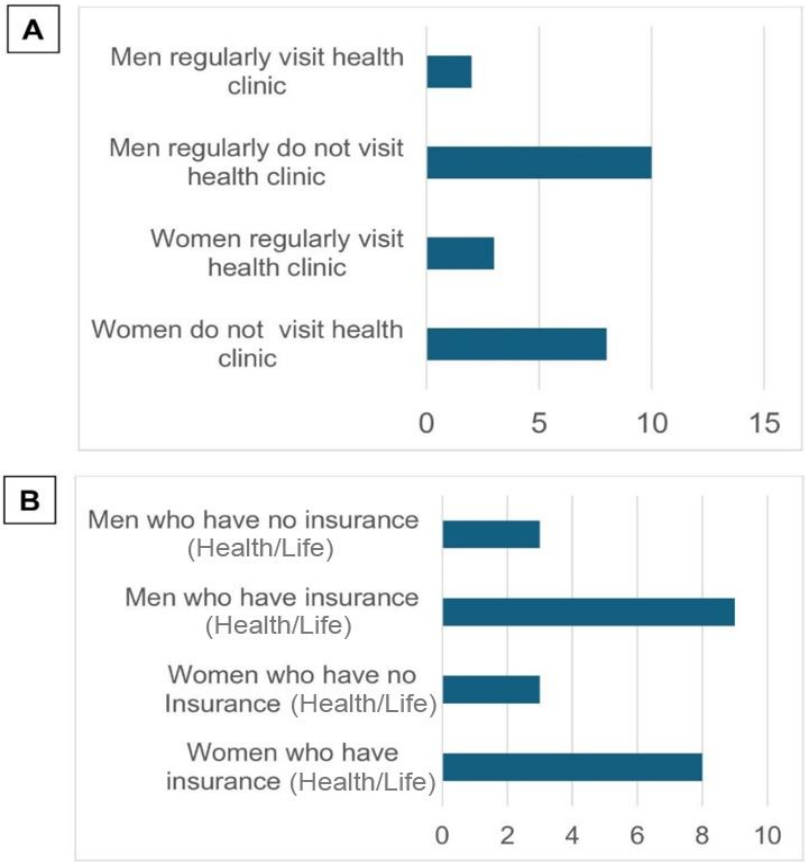

Figure 5. Mental (A) and physical (B) fitness of elderly people in MIG/HIG.
Note: See Table 5 for details.

5.3. Low Income Group (LIG)

The low-income group (LIG) elderly people are at high risk in terms of very poor financial conditions, no health awareness, no health, and life insurance. Many of them receive "Bardhyaka bhata" or "Bidhoba bhata" but this amount is only INR 1000.00 (JPY 1784) per month. They have difficulties in getting this little money; many informed that are not receiving it. Almost all (except less than 5%) have their own accommodation and hence they need not to pay rent. But this Bardhakka bhata/Bidhoba bhata is inadequate. Many of them cannot afford to purchase medicines. They use mobiles mostly for communication. They cannot afford the internet. These elderly people are physically and mentally unfit as well (Figure 6). They cannot socialize; they are an important component of their family in day-to-day work. But they do not find time and opportunity for socialization. This is more acute for the male elderly population of the low-income group. It is extremely important to think of social innovation in this sector. Female residents who are upto the age of 60, cannot participate in SHG, and there is no such initiative for the male elderly population. Males are frustrated and spend valuable time just by chatting or in work that do not help them to earn. This is a waste of time and energy.

Thus, it is clear that there are some differences between elderly male and female of the LIG. From the interview it is clear that the elderly males are generally introvert. They generally do not interact with others in their day-to-day life and thus, are socially isolated. On the other hand, the LIG female (1) cook food at home (2) do household work and spend time with their grandchildren and family members, (3) participate regularly in religious festivals and social gatherings, (4) many of them regularly visit health clinic for check-up, and (5) actively participate in the Self-Help Group activities. Thus, they remain active and both physically and mentally fit. The LIG women are more health consciousness than the men. They realize the fact that staying healthy is essential. Even if they do not go for physical exercise on a daily busy, their day-to-day activities keep them active and physically and mentally better than the elderly men.

5.4. Old Age Homes (OAH)

The number of OAHs and the number of residents at each old age home increased because children moved to different cities and bearing expense and care giving become difficult. Old age home is a better solution for them. This is because of relatively cheaper food, accommodation, and regular medical check-up costs. A nurse/care giver at an old age home can take care of elderly people, like timely giving medicine, physical support for movement, contacting doctor or hospital in case of emergency etc. Social interaction between residents is very helpful for better mental health. This is something that elderly people staying with their families are missing because of loneliness. In private old age homes, infrastructures, and facilities (e.g., physical exercise, cultural events) are major problems. The rent is inadequate to provide such facilities. The infrastructure is very poor. So, there is no scope for income generation. This is unlike the Government sponsored OAHs where income generation is possible, where the residents prepare food, make toys, draw pictures etc. and sell those items. The income is deposited to the Organization and a certain percentage is given to those engaged in preparing those items, including food. The residents express their thoughts and personal experience in a little magazine which is a nice way to encourage creativity. Elderly people who are staying with their family members (i.e., not at an old age home) generally miss this. This should be followed by other elderly people as well for better mental health and social interaction. In some OAHs, they encourage mixing among the old age home residents and common people. They arrange for free medical checkup once a week, when the residents meet doctor downstairs and meet local people who are also encouraged for free medical checkup and physiotherapy in the same clinic (within the premise). There are cultural activities, music lessons, recitation, and other activities for the residents. Most of the residents participate except a few who are physically unfit to participate (Figure 7).

5.5. Statistical Analysis

Most of the data collected during fieldwork is categorical data. Categorical measurements are not given in numbers but rather in *natural language descriptions* (Andersen, 1994). In statistics, categorical data is qualitative data that can be grouped into categories instead of being measured numerically (see http://www.stat.yale.edu/Courses/1997-98/101/catdat.htm.). Surveys through questionaries involve use of categorical data. Bar graphs and pie charts are the best way to show this data (Andersen, 1994). Tables 2-4 present the data collected during the field work through interviewing the elderly men and women (see Table 1 for grouping). Figures 4-7 present field data collected from different income groups and OAHs. Bar diagrams are constructed as this is the best way to represent categorical data (Andersen, 1994). MS Excel program was used to construct the bar diagrams.

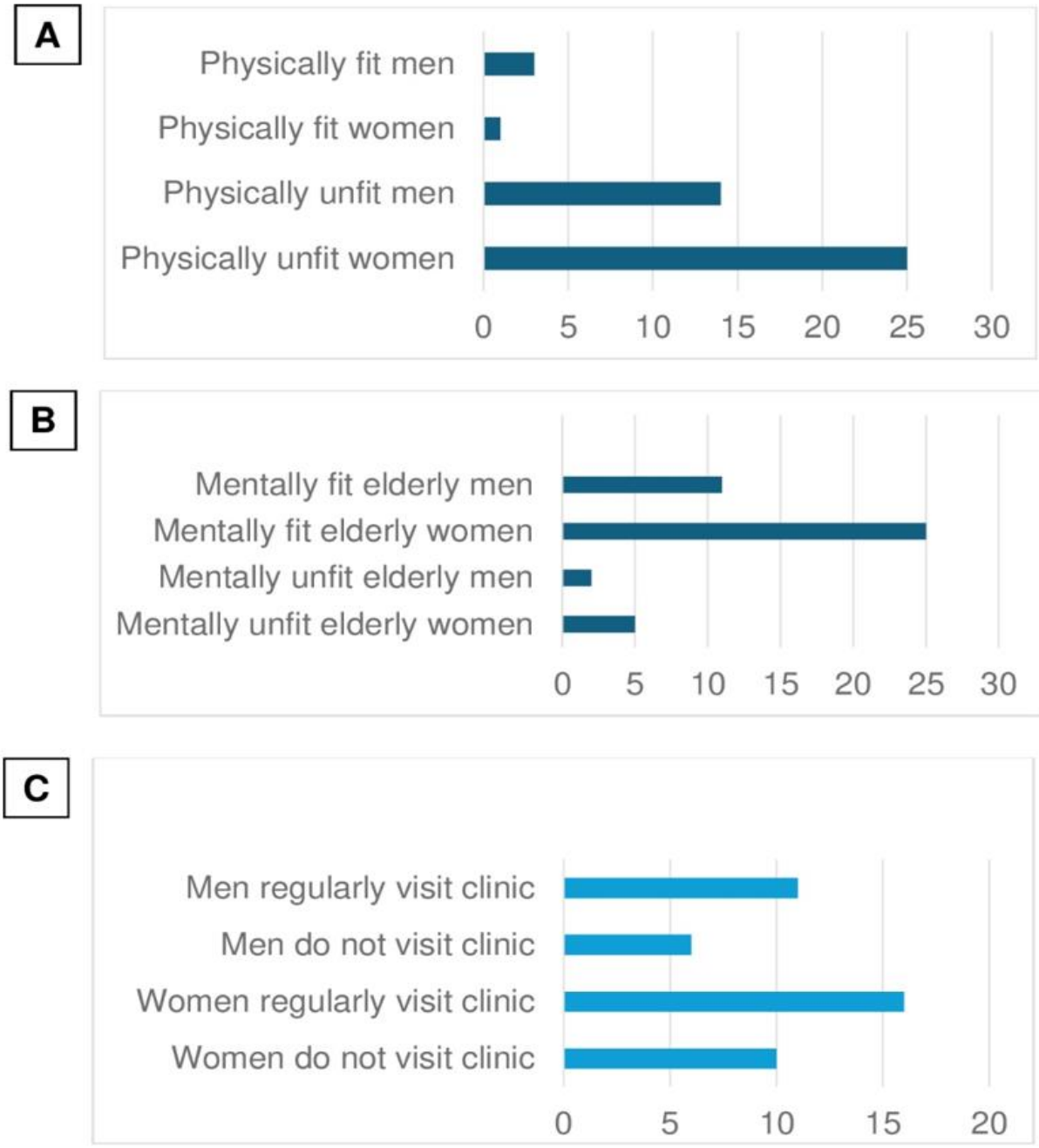

Figure 6. Physical (A), and mental (B) fitness and health check-up (C) status of elderly people of the LIG.
Note: See Table 5 for details.

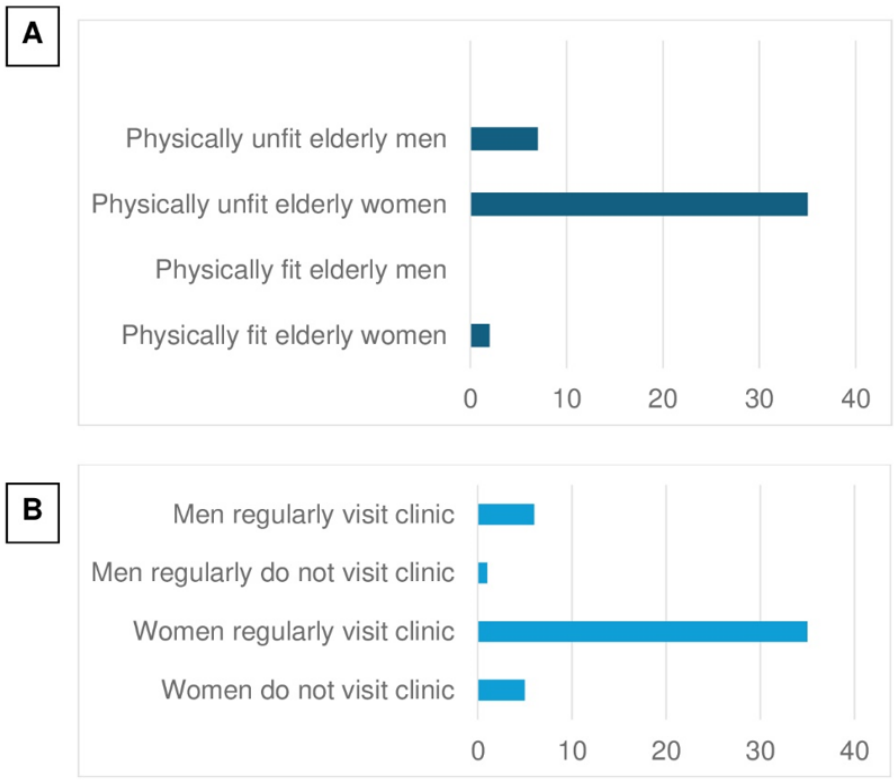

Figure 7. Physical fitness (A) and regular doctor check-up statistics (B) of elderly people living in OAH. None of the elderly people are mentally unfit.
Note: See Table 5 for details.

Figure 8. Adjusted correlation plot of categorical data using model matrix
Note: L=low, M=medium, H=high; Income Group and Sex were considered in this plot. See text for details.
Source: Ugoni and Walker (1995) and Andersen (1994).

5.5.1. Interpretation

In the MIG/HIG, mentally unfit elderly people are either widows or live alone (children moved away for jobs or higher studies) (Figure 4A). There are requirements/scope for improving physical as well as mental health (Figure 4B). Health issues are major concerns in HIG/MIG residents.

Many of them do not consult the doctor regularly or do not go for regular health checkups (Figure 5A). These residents mostly have health/life Insurance (Figure 5B). The elderly people of the LIG are generally physically and mentally unfit (Figure 6A). Women are physically as well as mentally much healthier than men (Figure 6B). Health awareness of women is better than men (Figure 6 C). The elderly people in the OAH are largely physically unfit. None of the men are physically fit. However, all of them are mentally fit because they share their thoughts and feelings with others easily (Figure 7A). Women are more health conscious than men (Figure 7B). None of the OAH residents interviewed have life/health insurance.

5.5.2. Correlation Analysis

For correlation analysis, I have considered eight variables: (i) sex, (ii) income group, (iii) living, (iv) financial support for health, (v) physical fitness, (vi) mental fitness, (vii) insurance, and (viii) clinic visit. Since there is very limited continuous data, a standard correlation (including calculation of correlation coefficient using numerical data) cannot be performed. Hence for the categorical variables, Chi square test of independence is done. Contingency tables are generated through MS Excel. Chi Square test calculated using the following programs:

https://www.socscistatistics.com/tests/chisquare2/default2.aspx

https://www.standarddeviationcalculator.io/chi-square-calculator

Initially we have considered only SEX and INCOMEGROUP variables to check whether there is any relationship between them. To check this relationship, we have used model matrix which creates a design matrix involving the variables SEX and INCOMEGROUP using $model.matrix()$ functionality in R. Post that covariance between each pair of variables is computed using all complete pairs of observations on those variables with the help of $cor()$ function. Finally, $ggcorrplot()$ is used to generate the graph above. The complete formula in R software is given below.

$$graph <- model.matrix(\sim 0+., data = dt2) \%>\% cor(use = "pairwise.complete.obs") \%>\% ggcorrplot(show.diag = FALSE, type = "lower", lab = TRUE, lab\_size = 2)$$

Even though the method mentioned above appears to provide some degree of association or disassociation between the observations (factors) from each variable, it does not provide any meaningful conclusion about the actual variables itself. Hence to get a more meaningful insight on the relationship of the variables we have used Chi-square test of independence for different combinations of the variables.

In statistics, a *contingency table* is a type of table in a *matrix format* that displays the multivariate frequency distribution of the variables. They are heavily used in survey research and business studies. We will be looking at the following seven combinations of variables for testing the independence of the variables. Accordingly, seven contingency tables (Tables 5-11) were generated. Each of these tables (Tables 5-11) basically presents a contingency table with two categorical variables. Various categorical variables used here are sex, income groups, physical fitness, mental fitness from different income groups and old age homes.

Table 5. Contingency table with sex and Income group as categorical variables.

	High	Low	Medium	Row totals
Female	5 (7.83) [1.02]	29 (24.92) [0.67]	13 (14.24) [0.11]	47
Male	6 (3.17) [2.54]	6 (10.08) [1.65]	7 (5.76) [0.27]	19
Column totals	11	35	20	66 (Grand total)

Table 6. Contingency table with sex and physical fitness for elderly people as categorical variables.

	Fit	Unfit	Row totals
High	7 (6.96) [0.00]	3 (3.04) [0.00]	10
Medium	9 (9.04) [0.00]	4 (3.96) [0.00]	13
Column totals	16	7	23 (Grand total)

Table 7. Contingency table with sex and mental fitness of elderly people as categorical variables.

	Fit	Unfit	Row totals
High	9 (9.13) [0.00]	1 (0.87) [0.02]	10
Medium	12 (11.87) [0.00]	1 (1.13) [0.02]	13
Column Totals	21	2	23 (Grand total)

Table 8. Contingency table with sex and physical fitness as categorical variables.

	Fit	Unfit	Row totals
Female	7 (6.96) [0.00]	3 (3.04) [0.00]	10
Male	9 (9.04) [0.00]	4 (3.96) [0.00]	13
Column Totals	16	7	23 (Grand total)

Table 9. Contingency table with sex and mental fitness as categorical variables.

	Fit	Unfit	Row totals
Female	9 (9.13) [0.00]	1 (0.87) [0.02]	10
Male	12 (11.87) [0.00]	1 (1.13) [0.02]	13
Column Totals	21	2	23 (Grand total)

Table 10. Contingency table with sex and physical fitness of OAH residents as categorical variables.

	Fit	Unfit	Row totals
Female	5 (4.205) [0.15]	32 (32.795) [0.019]	37
Male	0 (0.795) [0.795]	7 (6.205) [0.102]	7
Column Totals	5	39	44 (Grand total)

Table 11. Contingency table with sex and clinic visits of OAH residents as categorical variables.

	Not regular	Regular	Row totals
Female	6 (5.86) [0.00]	30 (30.14) [0.00]	36
Male	1 (1.14) [0.02]	6 (5.86) [0.00]	7
Column Totals	7	36	43 (Grand total)

5.5.3. Findings from Statistical Analysis and Correlation Analysis

Major findings from statistical and correlation analysis are as follows:

1. Female elderly people dominate in the OAHs.
2. The number of OAHs and the number of residents at each old age home increased; no scope for income generation in private OAHs.
3. In the government sponsored OAHs income generation is possible: residents are NOT socially isolated.
4. Health issues are major concerns, no financial issues.
5. Many elderly people, particularly in the LIG are at high risk in terms of very poor financial conditions, no health awareness; male residents are not socialized.
6. Sex and income groups are related to each other; males more likely belong to higher income group then females.
7. None of the other combination of categorical variables have any apparent relationships (correlation).

5.6. Policy Analysis

India's young demography is often invoked to proclaim a superpower potential. Most of the public policies and schemes caters to the youth – the young *"demographic dividend."* But a rapidly growing elderly population could negate those effects as the working population shrinks and healthcare services take on the extra load.

5.6.1. Indian National Policy on Ageing People

Government of India's commitment to population ageing concerns is evident in some its laws and policies.

1. The National Social Assistance Program for the poor is an outcome of the Directive Principles of the Indian Constitution (Articles 41–42), recognizing concurrent responsibility of the central and state governments in this regard.
2. India is a signatory to all the global conferences, initiatives on ageing as well as the Regional Plans of Action.

5.6.2. Policy Documents

A number of policy documents were consulted; these include:

1. *National policy for senior citizens 2011*: (https://vikaspedia.in/social-welfare/senior-citizens-welfare/policies-and-acts-1/national-policy-on-senior-citizens-2011).
2. *Elderly in India 2021, Government of India:* (www.mospi.gov.in)
3. *India's ageing report 2023:* https://india.unfpa.org/sites/default/files/pub-pdf/20230926_india_ageing_report_2023_web_version_.pdf.
4. *Senior care reforms in India Niti Aayog 2024:* (https://www.niti.gov.in/whats-new/senior-care-reforms-india-reimagining-senior-care-paradigm).

5.6.3. Support from Indian Government

1. Caring for the elderly is a directive principle of state policy according to article 41 of the Constitution India
2. However, the facts on the ground tell a different story: between 2012 and 2016 the Government of India released INR 70 million towards the running of old-age homes.

5.6.4. Key Highlights of the Niti Aayog 2024

1. Demographics and Trends: 340% increase in ageing people (>75 years) between 2011 and 2050.
2. Health Status and Challenges: Poor health; 20% have mental health issues.
3. Rural Urban Divide: 71% of elderly persons reside in rural areas.
4. Life Satisfaction: ~32% of the elderly reported low life satisfaction.
5. Policy and Infrastructure: Very poor; lack of monitoring mechanisms and emergency response systems.
6. Access to healthcare system: 43 physicians/100,000 population (in rural areas), 118 physicians/100,000 population in urban areas
7. Economic Implications: Medical expense of elderly people > double of common people.
8. Longitudinal Ageing Study of India (LASI) 2021 Report: Chronic diseases, functional limitations, depressive symptoms

5.6.5. Recommendations

1. *Health Domain:* Promote health literacy; enhance skilled workforce; establish a national senior care center.
2. *Social Inclusion:* Formulate peer support groups under the 'Elder for the elderly' model legal reforms
3. *Policy:* Implement elderly-friendly housing sector reforms; one stop' centralized portal
4. *Economic Empowerment:* Create work opportunities under "grey intern act"
5. *Digital Inclusion:* Accessibility to devices; digital literacy.

6. *Silver Economy: India is the fastest-growing "silver economy" in the world (Coldwell Banker Richard Ellis, CBRE report); future growth potential of senior living and care segment in the country promising.*

5.7. Overall Findings from Data Analysis

- Many of the elderly in India survive on a pension as low as rupees (INR) 500 per month (~JPY 950).
- Around 20 percent of the elderly in India live alone or with their spouses which leaves them vulnerable to illnesses and crimes.
- The Crime Records Bureau reveals a 9.7% annual increase in crimes against the elderly, those who live with family.
- In addition, elderly men and women are vulnerable to abuse by relatives.
- Many schemes were taken by the Indian Government to support the ageing people in India.
- The socio-demographic data are largely categorical, hance finding statistical correlation is difficult.
- As the LIG people have almost no income, and no insurance coverage, they need financial support for survival.

Table 12. Physically and mentally unfit elderly people in different income groups and old age homes.

Income group/OAH	Physically unfit	Mentally unfit	No of elderly people *not* visiting clinics on a regular basis
LIG	Male: 14 Female: 25	Male: 2 Female: 5	Male: 6 Female: 10
MIG/HIG	Male: 4 Female: 4	Male: 2 Female: 2	Male:10 Female 8
OAH	Male: 7 Female: 35	Male: 0 Female: 0	Male: 1 Female: 5

6. DISCUSSIONS

Data analysis reveals several important aspects of population aging in different income groups staying in urban housing societies as well as in old age homes. Table 12 presents physical and mental fitness of elderly male and female from different income groups who are residing with their family members and old age homes. In general, elderly people staying in old-age homes are physically and mentally in better condition than their counterparts living with family members in urban housing societies (Table 12). This was also previously reported by Panday et al. (2015) from Jharkhand, India. However, social networking opportunities are much better in urban housing societies. Although the elderly residents of urban housing societies do not have financial problems and live a peaceful life, they feel lonely. Majority of them are staying alone and their grown-up kids moved to different metropolitan cities of India and abroad. We have noted several areas that deserve closer scrutiny, and recommended gender wise social innovation for all income groups below.

6.1. Research Findings

We summarized five *key research findings* in various income groups and OAHs.

Key findings 1**.** [elderly residents of OAH]**.**

- Female elderly people dominate in the OAHs (Table 13).
- This is largely due to the early marriage of the female participants and longer life span.

Key findings 2: [elderly residents of private OAH]**.**

- The number of OAHs and the number of residents at each old age home increased.
- In private old age homes, there is no scope for income generation.

Key findings 3**:** [elderly people in private OAH].

- In the Government sponsored OAHs income generation is possible.
- In some OAHs, they encourage mixing among the old age home residents and common people; cultural activities; residents are NOT socially isolated.

Key findings 4: [elderly residents of HIG and MIG]**.**

- Health issues are major concerns; many of them do not consult doctor regularly or do not go for regular health checkups (Table 13; Figures 5-6).
- None of the people interviewed have financial issues; have life and health insurance.

Key findings 5: [elderly residents of LIG].

- The low-income group (LIG) elderly people are at high risk in terms of very poor financial conditions, no health awareness, no health, and life insurance. Many of them receive "Bardhyaka bhata" or "Bidhoba bhata" but this amount is only INR 1000.00 (JPY 1784) per month. They have difficulties in getting this little money
- Very poor digital literacy.
- Male residents are not socialized; no SHG for male residents; Males are frustrated and spend valuable time just by chatting or in work that do not help them to earn. This is a waste of time and energy.

Table 13. Broad aspects of social innovation in various income groups and residents of old age homes, Kolkata .

Category	Physical health	Mental health	Finance	Food	Transport	Information technology	Social innovation
HIG AND MIG (MALE)	No regular health check-up (except a few); visit doctor when required. Generally, physically fit. Has health insurance and life insurance.	Most of the persons interviewed are mentally fit. A few feels lonely sometime but tries to engage through participation in cultural function or social gathering.	Financially sound. Received pension. Many of them earn interest on their savings. Have Health and life insurance.	No issue. They get quality food and follow instructions of doctors.	No issue with transportation; have own cars and can book rented car online.	**1.** Access to internet. **2.** Access to electronic devices for recreation and socialization. **3.** Relatively better digital literacy but unable to communicate with younger generation.	Elderly people are experienced but cannot share their experience with the younger generation as most of them are not digitally literate. Therefore, digital literacy must be spread and encouraged by the government.
HIG AND MIG (FEMALE)	No regular health check-up (except a few); visit doctor when required. Generally, physically fit. Has health insurance and life insurance.	Most of the persons interviewed are mentally fit. Some females are lonely because either they lost their spouse or have son/daughter staying in other metropolitan city or overseas.	Financially dependent on their spouse. No financial problem. Have Health and life insurance.	No issue. They get quality food and follow instructions of doctors.	No issue with transportation; have own cars and can book rented car online.	**1.** Access to internet but do not use much. **2.** Access to TV. **3.** Digital literacy is poor.	People should be encouraged to visit a health clinic for monthly health check-up. Local doctors/health clinics should take the initiative to spread awareness.

Category	Physical health	Mental health	Finance	Food	Transport	Information technology	Social innovation
LIG (MALE)	No regular doctor visit/check-up. No health insurance. No life insurance.	In general, mentally the males are relatively stronger than females. However, a few of them who has health issues, are mentally a bit weak. Lack of savings and insurance are really concerning.	The most acute problem is finance. Either receive monthly Rs. 1000 or have no earning. They do not have any life insurance and health insurance. Unlike female, they are not part of Self-help group.	**1.** Poor financial condition is the impediment to get healthy food. **2.** Occasionally take outside food, mostly during festival.	**1.** Do not have many choices for transportation; need to depend on public transport which is very limited during odd hours. **2.** Can drive cycles and other two wheelers in remote areas. **3.** Problematic if someone is ill and need to visit doctors or hospital.	**1.** No access to internet. **2.** Use mobile phone for communication only. **3.** No digital literacy.	**1.** Medicines are often expensive. Therefore, the Government and private funding agencies should work together to formulate very low premium family health insurance and individual life insurance. **2.** Women can mix with each other easily, but this is not the case with men, particularly those who are introvert. Local clubs should arrange cultural and social programs and activities and encourage people to participate. **3.** Those who knows creative art like drawing, making cheaper household items etc. should be encouraged by local businessmen and well-wishers by investing money. Government should give tax rebate/reduction of income tax.
LIG (FEMALE)	No regular doctor visit/check-up. No health insurance.	Many elderly females have family issue or have poor health condition. Hence, they are mentally weak.	Some females receive monthly Rs. 1000. Many have no earning.	**1.** Poor financial condition is the	**1.**Very limited choice of transportation, particularly during the odd hours.	**1.** No access to internet. **2.** Watch TV serials. **3.** No digital literacy.	**1.** Start-up fund/loan at very low interest from the NGOs/Government/private organization to start up small

Category	Physical health	Mental health	Finance	Food	Transport	Information technology	Social innovation
	No life insurance.	Lack of savings and insurance are major reasons for poor mental health.	Some females are engaged in Self-help group. They do not have any life and/or health insurance.	impediment to buy healthy food. **2.** They cook food at home but occasionally take outside food normally during festival or occasions.	**2.**Most of them unable to drive two wheelers. **3.** Acute transportation problem while consulting doctor in distant places/hospital.		businesses like selling cooked food, local grocery shops, paid services like cleaning of room, gardening, formation of agencies that can supply maid, caretaker, guard etc. to the medium and high-income group (e.g., in residential complexes). **2.** Transportation is generally ok but there are remote areas further south of Kolkata. *Drones* can be used to deliver medicines and food, particularly during floods or any natural calamity. Recently this has been done in the Newtown area, Kolkata.
OAH (MALE)		Mental health of the males is a concern**.** Most of the male elderly people investigated are frustrated. Their family member meets them occasionally. Lack of money to fulfil their expenditure. This is particularly the case with males at Ramthakur Briddhabas.	Except ABWA and Kalyan Asram, all other OAH are suffering from lack of financial suppose.	**1.** Food prepared by OAH and this is a paid services. **2.** Male residents accept the food provided by the OAH.	**1.** The transportation as this is organized by the OAH. **2.** Some elderly men have issues with walking. They are unable to walk and hence some wheelchairs are required.	**1.** Access to TV **2.** Access to internet/mobile data **3.** No digital literacy	Elderly men (and women), who are academically qualified should be engaged in teaching primary and high school students to overcome loneliness. At the same time, this may generate some income if the students are able to pay tuition fees (this should not be mandatory)

Category	Physical health	Mental health	Finance	Food	Transport	Information technology	Social innovation
OAH (FEMALE)		Mental health of the elderly females is much better as they interact with each other. They participate in cultural programs, gets opportunity to participate in social programs and festival.	Financial conditions/support received by All Bengal Women's association and Kalyan Asram is much better than other private OAHs where the residents need to pay. The management suffers from funding when residents are unable to pay for some personal problems.	**1.** Food prepared by the OAH management. **2.** Some female residents have issues with OAH management where they pay for their food and accommodation.	**1.** Transportation is organized by OAH. **2.** Some elderly women could not walk, and need supports for walking. Wheelchairs are required.	**1.** Access to TV **2.** No access to internet/mobile data. **3.** No digital literacy.	Self Help Group (SHG) is certainly an option but in West Bengal this is limited only to women who are 60 years or younger. There are physically and mentally capable women who are over 60 but cannot participate in SHG. There should not be any upper age limit for SHG.

Note: LIG= Low income group, HIG= High income group, MIG= Middle income group, OAH= Old age home.

6.2. Social Innovation

Based on our data analysis, we recommend social innovation for the elderly people in different income groups and OAH residents (Table 13).

6.2.1. Financial Situation

The financial condition of the low-income group is extremely poor. Income generation is a must. This is not an issue with the middle- and upper-income group. This can be done by:

- Providing start-up fund/loan at very low interest from the NGOs/Government/private organization to start up small businesses like selling cooked food, local grocery shops, paid services like cleaning of room, gardening, formation of agencies that can supply maid, caretaker, guard etc. to the medium and high-income group (e.g., in residential complexes).
- Those who knows creative art like drawing, making cheaper household items etc. should be encouraged by local businessmen and well-wishers by investing money. Government should give tax rebate/reduction of income tax.
- A list of people who have no income must be prepared and such needy people should be provided at least Rs. 3000 per month (one person per family) by the Government. If Government funding is not available (now it is Rs. 1000 per month and irregular) such people should get subsidized food from selected shops/supermarket and this expenditure should be borne by well-wishers, NGOs, or local rich people.

6.2.2. Health and Life Insurance

None of the low-income group people interviewed have health and life insurance. This is extremely annoying. Middle and high-income groups have health and life insurance.

- The West Bengal Government issued "Swastha Sathi Card" but that is for basic treatment in Government hospital. Medicines are often expensive. Therefore, the Government and private funding agencies should work together to formulate very low premium family health insurance and individual life insurance.
- People should be encouraged to visit a health clinic for monthly health check-up. Local doctors/health clinics should take the initiative to spread awareness. This is applicable for all people irrespective of their income. Many middle- and high-income group people are not healthy.
- In addition to physical health, mental health needs attention; this is particularly for male. Women can mix with each other easily, but this is not the case with men, particularly those who are introvert. Local clubs should arrange cultural and social programs and activities and encourage people to participate.

6.2.3. Loneliness (SHG)

Self Help Group (SHG) is certainly an option but in West Bengal this is limited only to women who are 60 years or younger. There are physically and mentally capable women who are over 60 but cannot participate in SHG. There should not be any upper age limit for SHG. People should be allowed to participate in the SHG.

- Men are not allowed/eligible for the SHG. There should be alternative arrangements. For example, elderly men, who are academically qualified should be engaged in teaching primary and high school students to overcome loneliness. At the same time, this may generate some income if the students are able to pay tuition fees (this should not be mandatory).
- In addition to physical health, mental health needs attention; this is particularly for male. Women can mix with each other easily, but this is not the case with men, particularly those who are introvert. Local clubs should arrange cultural and social programs and activities and encourage people to participate.

6.2.4. Accessibility to Technology

- This is the biggest issue among elderly people. Elderly people are experienced but cannot share their experience with the younger generation as most of them are not digitally literate. Therefore, digital literacy must be spread and encouraged by the government.
- Most of the people have access to mobile phones but they cannot afford to pay for mobile data for entertainment. Thus, financial incompetence is also related to non-accessibility of technological innovations.

6.3. Future Research Directions

West Bengal, the eastern state of India is dealing with a population that is ageing rapidly. According to the prediction, by 2026, the number of ageing people (60 years and above) in Kolkata will be 17% of the entire population of West Bengal (Kurian et al., 2023). A number of factors, such as financial instability, lack of life and health insurance, social isolation, inadequate digital literacy, etc. are affecting Kolkata's ageing population.

The problem is becoming acute due to inadequate efficient caregivers, geriatric specialists, and healthcare people. The support from the Government sector is inadequate in Kolkata and West Bengal. The West Bengal and Central Government's support towards the ageing population of Kolkata and Bengal is very limited. Future research should highlight these issues and directed towards attracting funding from abroad, including contributions from the non-residential Indians (NRI) to solve ageing issues. The NGOs should seek funding from abroad.

Ageing is now a global issue and developed countries like Japan, USA are working hard through systematic and well-planned strategies (https://www.usjapancouncil.org/aging-populations-developing-solutions/). Japan is considered as world's laboratory for drawing policy lessons on aging populations. The strategies taken by Japanese Government might not be fully applicable but can motivate Indian central and state Governments to look for new strategies applicable for India to address ageing population in India.

7. CONCLUSIONS

In-depth study of elderly male and female from urban housing societies and old age homes reveal several interesting aspects of aging. Comparative studies reveal that elderly people residing in old age homes are physically and mentally much better than their counterparts residing in urban housing societies. Elderly people of low-income groups are suffering from acute financial problems and consequent health and mental issues. Male elderly people generally do not have social networking. None of the elderly people from the low-income group has life and health insurance. On the other hand, the elderly people of the medium to high-income group have no financial problem; but they are 61uffering from physical and mental health issues. Most of them do not visit doctors for health checkups on a regular basis. We have recommended social innovation for elderly people from all income groups. The main conclusions are:

- Elderly people of LIG are suffering from acute financial problems and consequent health and mental issues. Male elderly people in the LIG do not have social media.
- None of the elderly people from the LIG has life and health insurance.
- MIG and HIG elderly people are 61uffering from physical and mental health issues. Most of them do not visit doctors for health checkups on a regular basis.
- Policy analysis is helpful to assess the challenges and issues. More socioeconomic research is required.
- The Indian government, NGOs, and the Non-residential Indians (NRIs) should work together to provide financial, infrastructural, and mental support.

Funding: This study received no specific financial support.
Institutional Review Board Statement: The Ethical Committee of the Keio University, Japan has granted approval for this study on 3 July 2023 (Ref. No. Keio/SFC/82226027/2023).
Transparency: The authors state that the manuscript is honest, truthful, and transparent, that no key aspects of the investigation have been omitted, and that any differences from the study as planned have been clarified. This study followed all writing ethics.
Competing Interests: The authors declare that they have no competing interests.
Authors' Contributions: Participated in data collection, analysis and writing the first draft of the manuscript, S.M.; participated in analysis, discussions, review and editing of the manuscript, R.S. Both authors have read and agreed to the published version of the manuscript.

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