

Changes in the Prevalence of Disability among Older Adults in India: Longitudinal Influence of Socio-economic and Health-related Factors

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Abstract

Background: While experiencing a double burden of both communicable and non-communicable diseases, three-fourth of the Indian population aged 50 and above are suffering from some form of disability. Existing studies on physical limitations highlight the determinants of late-life disabilities, however, limited evidence has shown how the socio-economic and health-related factors influence the elderly recovering or acquiring disability status in the Indian context.

Method: The current study uses two waves of the India Human Development Survey (IHDS) and is based on panel data of 10527 older adults. Both bivariate and multiple variable regression analysis were performed using two binary outcome variables in this study – whether older adults acquired disability and recovered from disability between round-I and round-II, respectively.

Results: Nearly 31.5% and 4.4% of older adults have acquired and recovered disability across the two rounds respectively. 38.5% and 45.8% of female older adults' disability status changes to disable and recovered in round 2 respectively. A lesser proportion of older adults have recovered from a disability who have a chronic disease in round 1. Cataract chronic conditions among older adults in round 1 had shown 1.45 times (CI: 1.07-1.97) a significantly higher likelihood of acquiring disability in round 2. Older adults who were unmarried and were not working in round 1 have 1.12 times (CI: 1.01-1.25) and 1.21 times (CI: 1.06-1.39) a higher likelihood of acquiring disability in round 2 respectively. Recovering from disability was mostly seen among older adults who belong to the richest (OR: 2.38, CI: 1.31-4.33) and medium (OR: 2.16, CI: 1.27-3.69) wealth quintile households. Older adults residing in the central region of India have 2.72 times (CI: 2.31-3.19) significantly higher chance of acquiring disability than those who were residing in northern regions.

Conclusion: Appropriate measures are required to highlight the importance of chronic physical diseases and several socio-demographic factors that may negatively affect the trajectory of disability in older ages.

1. Introduction

Due to the ongoing demographic transition towards an ageing population, there is an increasing trend in the prevalence of late-life disabilities especially in developing countries (Lestari, Ng, Kowal, & Santosa, 2019; Reza et al., 2016). While experiencing a double burden of both communicable and non-communicable diseases (Kowal et al., 2012), three-fourth of the Indian population aged 50 and above are suffering from some form of disability (He, Muenchrath, & Kowal, 2012).

Multiple studies found that older age, female sex, being widowed or single, sedentary physical activity, obesity, smoking, or having chronic diseases are commonly associated with disability (Dunlop, Manheim, Sohn, Liu, & Chang, 2002; Ouden, Schuurmans, Mueller-schotte, Brand, & Schouw, 2013; Ta et al., 2011). Besides, older people with low socioeconomic status, lower levels of education, less engaged in social activities, not in the working force, and have poor health status were more likely to have disabilities

(Firenze et al., 2010; Palacios-Ceña et al., 2012; Ta et al., 2007; Tak, Kuiper, Chorus, & Hopman-rock, 2013). Studies based on World Health Organization (WHO) Study on global Ageing and adult health (SAGE) data have explored the association between socio-demographic factors, chronic diseases, and disability (Basu & King, 2013; Gomez-olive et al., 2017; Rahman & Singh, 2018; Stewart Williams, Norström, & Ng, 2017), and found education and employment-driven inequalities in the prevalence of disability and its concentration in the rural areas of the developing countries.

Similarly, factors associated with no recovery from disability were chronic diseases, depression, older age, female gender, and low educational level (Pérès, Verret, Alioum, & Barberger-Gateau, 2005). However, a recent study among older Mexican adults suggested that some health conditions, age, and gender were also associated with an improvement or a recovery from disabilities (Díaz-Venegas & Wong, 2020). Findings also suggest that older adults with illnesses are often forced to alter their lifestyle and prefer better nutrition, increase physical activity and social participation and reduce or quit alcohol consumption and tobacco use thus improving their well-being and resulting in recovery from disabilities (Janevic et al., 2004; Nelson et al., 2007). At the same time, in a community-based study, a greater number of limitations in functional health was shown as a predictor of failing to recover from disabilities in old age (Boyd et al., 2008).

The literature on gender differences in functional limitations and disabilities has shown a female disadvantage (Anand, Syamala, Sk, & Bhatt, 2020; Hosseinpoor, Williams, Jann, Kowal, & Officer, 2012; Stewart Williams et al., 2017). It is demonstrated that older women have a lower probability than older men of recovering after reporting functional limitations (Gu, Vlosky, & Yi, 2009). A review of resilience literature shows that those living in rural areas might show signs of high resilience by overcoming socioeconomic obstacles and being able to live a decent life despite declining health and the presence of multiple functional limitations (MacLeod, Musich, Hawkins, Alsgaard, & Wicker, 2016). The study also reveals that living alone and other sociodemographic factors play a significant role in disability dynamics (Gu & Yi, 2004).

There is a lack of availability of country-specific nationally representative data in the field of disability epidemiology in developing countries (Kowal et al., 2010). Further, a better knowledge of the determinants of changes in the disability status will be helpful from the perspective of establishing preventive health priorities among the older population. Since existing studies on physical limitations highlight the determinants of late-life disabilities, we focus on the associated factors of recovery from or acquiring of disability in old age. Thus, using a national sample of older Indian adults aged 60+, the present study aims to explore how common is recovery from disability among the older population of a developing country like India, and how do various socioeconomic and health-related conditions impact this recovery.

2. Data, Variables And Methods

2.1 Data source

This study used round-I and round-II of the India Human Development Survey (IHDS). IHDS round-I, conducted during 2005, is a nationally representative and multi-topic survey of 41554 households across all the states and union territories of India except for Andaman & Nicobar Islands and Lakshadweep (S. Desai, Vanneman, & National Council Of Applied Economic Research, 2008). IHDS round-II, conducted in 2012, is also a nationally representative and multi-topic survey of 42152 households with geographical coverage similar to round-I (S. Desai & Vanneman, 2015). IHDS round-II re-interviewed 83% of the households from round-I. Both rounds of IHDS adopted a multistage stratified random sampling design. Further details regarding the IHDS sampling frame, data collection procedure and respondent consent can be found elsewhere (S. B. Desai et al., 2010; S. Desai, Dubey, & Vanneman, 2015).

In this study, we refer to persons aged 60 years and above as older adults. During IHDS round-I, there were 17904 individuals and among them, 4736 older adults were not alive and 2641 older adults were lost to follow-up during round-II. Thus, our current study is based on panel data of 10527 older adults. Additionally, there were no records with missing information for all the variables used in our study.

2.2 Outcome variables

We used two binary outcome variables in this study – whether older adults acquired disability and recovered from disability between round-I and round-II, respectively. Both these outcome indicators were obtained from an older adult's self-reported disability status during both rounds of IHDS. During both rounds, IHDS asked respondents that whether they had difficulty in – “walking 1 km”, “going to the toilet without help”, “dressing without help”, “hearing normal conversation”, “speaking normally”, “seeing distant things” and “seeing near objects such as reading/sewing”. Responses to these seven questions were coded as “0” (No difficulty), “1” (With difficulty) and “2” (Unable to do it). We summed the coded responses for each person to obtain a disability score ranging from 0 to 14 and found the median disability score to be 0 in both rounds. Therefore, older adults with a score of 0 were classified as “not disabled” and with a score above 0 were classified as “disabled”.

In the acquired disability variable (no, yes), older adults who not disabled in 2005 but were disabled during 2012 were categorized as “yes” and otherwise were categorized into “no”. Equivalently, in the recovered from disability variable (no, yes), older adults who disabled in 2005 but were not disabled during 2012 were categorized as “yes” and otherwise were categorized into “no”.

2.3 Control variables

Existing studies have shown several factors, which influences the change in disability status among older adults. We controlled for the confounding effects of the majority of these variables, conditional to their availability in the IHDS dataset. The demographic and social control variables related to the older adults include – gender of individual (male, female), age group (60–69 years, 70–79 years, 80 + years), current marital status (currently married, currently not married), level of education (no formal schooling, less than 5 years of schooling, 6–10 years of schooling, more than 10 years of schooling), working status (working, not working). Additionally, we included self-reported indicators of chronic illness indicating whether an older adult has – cardiovascular diseases (no, yes), hypertension (no, yes), diabetes (no, yes), respiratory

illness (no, yes), cataract (no, yes) and any other chronic illness other than the above (no, yes). We also controlled for relevant household socio-economic characteristics – headship status (no, yes), family structure (joint/extended, nuclear, single generation), wealth quintile (poorest, poor, medium, rich, richest), household below poverty line (BPL) status (no, yes), the caste of household (scheduled tribes (ST), scheduled castes (SC), other backward classes (OBC), others), the religion of household (Hindu, Muslim, others), place of residence (urban, rural). Additionally, we also included the country region that a person comes from (northern, north-eastern, central, eastern, western, southern). All the above characteristics were measured for the older adults during round-I.

During round-I IHDS collected information on the marital status of each person and originally categorized them into six categories – “spouse absent”, “married”, “single”, “widowed”, “separated/divorced” and “no gauna”. Owing to the skewed population distribution across each category, we have recoded the original variable into a binary marital status variable (currently married, currently not married). Here, all individuals not included in the “married” category in the original variable were included in the “currently not married” category of the recoded variable.

IHDS obtained the information on whether each person reportedly suffered from – cataract, tuberculosis, hypertension, cardiovascular diseases, diabetes, leprosy, cancer, asthma, polio, paralysis, epilepsy, mental illness, sexually transmitted diseases (STD) and any other chronic disease. If an older adult suffered from the above chronic diseases, then they were coded as “yes” and otherwise they were coded as “no”.

Household family structure was obtained from the information given on the relationship of each household member with the head of the household. Based on this information we classified the family structure into – single generation, nuclear and joint/extended family. The single generation includes a married/cohabiting couple or a single person household. The nuclear family includes married/cohabiting partners along with their dependent and unmarried children. The joint family includes a parent and/or partner along with their children and grandchildren. The extended family is similar to a joint family structure with the exception that it also includes “extended members”, that is, people who are not directly related to the household head by blood.

The household wealth quintile for round-I was calculated using principal component analysis (Filmer & Scott, 2008). We generated a wealth score for each household using the available information on household asset ownership, livestock ownership, building material used in household, household water source, household sanitation facility and the number of rooms. Based on the wealth score we categorized the households into five categories (poorest, poor, medium, rich, and richest).

The country regions during round-I were formed by dividing the erstwhile 33 states and union territories of India into six regions. The northern region includes Chandigarh, Delhi, Haryana, Himachal Pradesh, erstwhile Jammu & Kashmir, Punjab, Uttaranchal and Rajasthan. The north-eastern region includes Assam, Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Tripura and Sikkim. The central region consists of Madhya Pradesh and Chhattisgarh. The eastern region includes Bihar, Jharkhand, Odisha and West Bengal. The western region comprises Dadra & Nagar Haveli, Daman & Diu, Goa,

Gujarat and Maharashtra. The southern region comprises erstwhile Andhra Pradesh, Karnataka, Kerala, Tamil Nadu and Pondicherry.

2.4 Statistical methods

We performed bivariate and multivariate analysis to achieve the study objectives. Owing to the binary nature of the outcome variable, bivariate analysis was done using the chi-square test for association. Equivalently, multivariate analysis was performed by estimating multivariable logistic regression models. Bivariate and multivariate analysis was performed in two sets by taking “acquired disability” and “recovered from disability” as the outcome variable respectively. Odds ratios in the multivariable models show the association between the outcome variables of change in disability status and the predictor variables. The odds ratio measures the odds of acquiring disability (or recovery from disability) relative to having no disability among the older adults belonging to a particular category of an explanatory variable given the effect of all the other explanatory variables remain constant (Cameron & Trivedi, 2005). The odds ratio can take any value above zero, with a value between 0 and 1 denoting a negative association, and a value more than 1 denoting a positive association.

Additionally, we checked for multicollinearity in both the regression models and found the mean value of the variance inflation factor (VIF) to be less than 1.35. Thus, our estimated regression models do not suffer from multicollinearity. All the statistical estimations were performed using the STATA software (StataCorp, 2015).

3. Results

Figure 1 presents the change in disability status of older adults across the two rounds of IHDS. Results show that 59.1% of older adults who did not suffer from disability in round 1 remain unchanged till round 2. Nearly 31.5% and 4.4% of older adults have acquired and recovered disability across the two rounds respectively. 5% of disabled older adults in round 1 remain disabled till round 2.

Figure 2 provides a cross-sectional view of disability status among older adults in India. Estimates from IHDS data show that 90.6% of older adults had recovered from disability and 9.4% of them suffered from disability in round 1 respectively. This distribution has changed shockingly from 63.5% recovered to 36.6% disabled older adults in round 2.

Table 1 presents the characteristics of 17,904 older adults from IHDS round 1 and 10,527 older adults who were followed up till the second round and alive in both rounds. During 2005, the distribution of older adults by gender differs by 1.9% between the cross-sectional and panel datasets. 61% of older adults lie in the age group of 60-69 in 2005 and this proportion increased to 69% in panel datasets. Married and working older adults have increased in panel dataset as compared to cross-sectional data. Cross-sectional data shows that 48.1% of older adults were head of the household in 2005 which differs by 1.2% from the panel datasets. Most of the older adults reside in a joint family (77%) and above poverty line household (80%) in both cross-sectional and panel datasets. 5.5% older adults participate in social

groups in 2005 and when they were followed up till the next round this proportion had increased to 36.2%. During 2005, the distribution of older adults by residence differs by 3.1% between the cross-sectional and panel datasets. The northern and southern regions of India show a hike of 0.9% and 1.8% of older adults respectively across the cross-sectional and panel datasets.

Table 2 presents the association of different bio-demographic and socio-economic characteristics of older adults in round 1 with their change in disability status in round 2. Among 9,533 older adults who were either disable or not disable in the first round, 3,317 older adults acquire the disability in the second round. 38.5% of female older adults' status changes to disable in round 2. Most of the older adults in the age group 70-79 acquired disability (42.3%). Nearly 40% of older adults who have the chronic disease like hypertension, cardiovascular disease, diabetes, or other chronic condition have acquired the disability status in round 2. 46% of older adults who have cataract condition in round 1 had acquired disability in round 2. 39% of unmarried older adults and 32.2% older adults who were head of the household have shown a change in their disability status (i.e., to disable). Attaining disability was mostly seen among older adults who were not working in round 1 (35.5%). Residing in a single generation (41.5%) and below poverty line household (37.2%) was mostly associated with acquiring disability in round 2. Rural elderly (35.6%) have mostly attained disability across the two rounds as compared to urban counterparts (33.4%). The central region of India had also experienced a higher change in disability status (i.e., those who acquired disability in round 2) among older adults. *Table 2* also provides the results of the change in disability status of older adults who have recovered from their disability in round 2. Among 994 older adults who were either disable or not disable in the first round, 463 older adults recovered from disability in the second round. 45.8% of female older adults' status changes to recovered in round 2. Most of the older adults in the age group 60-69 recovered from disability (51.5%). A lesser proportion of older adults have recovered from a disability who have a chronic disease in round 1. 47% of older adults who were married and head of the household have shown a change in their disability status (i.e., to recovery). Residing in a nuclear generation (52.5%) and among medium wealth quintile households (52%) was mostly associated with recovering from disability in round 2. Urban elderly (52.8%) have mostly recovered from disability across the two rounds as compared to rural counterparts (44.5%). North-eastern and eastern regions of India had also experienced a higher change in disability status (i.e., those who recovered from disability in round 2) among older adults.

Logistic regression results are presented in *Table 3* to show the association of different characteristics of older adults in round 1 with their change in disability status when followed up to round 2. The analysis shows the estimates of the adjusted odds ratio of different characteristics of older adults who have either acquired or recovered from disability. Acquiring disability in round 2 was 1.40 times (CI: 1.12-1.61) significantly higher among female older adults. With the growing age likelihood of acquiring disability among older adult's increases and their chance of recovering from disability decreases significantly. Rather than hypertension, diabetes, and respiratory illnesses, only cataract chronic conditions among older adults in round 1 had shown 1.45 times (CI: 1.07-1.97) a significantly higher likelihood of acquiring disability in round 2. Older adults who were unmarried and were not working in round 1 have 1.12 times (CI: 1.01-1.25) and 1.21 times (CI: 1.06-1.39) a higher likelihood of acquiring disability in round 2

respectively. Residing in a single generation household had also increased the chance (OR: 1.35, CI: 1.16-1.57) of acquiring disability in round 1. Recovering from disability was mostly seen among older adults who belong to the richest (OR: 2.38, CI: 1.31-4.33) and medium (OR: 2.16, CI: 1.27-3.69) wealth quintile households. Older adults residing in the central region of India have 2.72 times (CI: 2.31-3.19) significantly higher chance of acquiring disability than those who were residing in northern regions. And recovery among older adults was mostly seen in the eastern regions of India (OR: 2.70, CI: 1.59-4.56).

4. Discussion

The present study uses a panel dataset of IHDS (2004-05 and 2011-12), which aims to capture the dynamics of older adults acquiring or getting recovered from disability. It was found that about 31.5% of older adults acquired disability from 2004-05 to 2011-12 and about 4.4% of older adults got recovered during the same period. Moreover, in 2011-12 nearly 36.6% of older adults were disabled in comparison to 9.4% in 2004-05. It was argued by WHO that the prevalence of disability among older adults is increasing drastically due to changing demographic trends, that is, an increase in the share of older adults and due to an increase in chronic health condition among older adults (World Health Organization, 2020).

Older women had a higher likelihood to acquire disability than older men. The results were consistent with previous literature, arguing that gender differences do exist as women develop disability more often than men do as their survival rates are higher than men (Guralnik, Leveille, Hirsch, Ferrucci, & Fried, 1972). Oldest-old had higher odds to acquire disability along with lower odds for recovering from disability than younger older adults. The results were paralleled with the previous finding that with an ageing population the occurrence of disability increases with the ageing population (Manini, 2012). Previous studies concluded that chronic diseases contribute significantly to the procurement of disability among older adults (Sousa et al., 2009). The present study also reveals that older adults with any chronic disease had a higher likelihood to acquire a disability.

Older adults with non-working status had higher odds to acquire a disability as compared to those with working status. The plausible reason is that older adults who were disabled were not able to work. Disability among older adults hinders the working status and hence poses an economic burden among older adults (Levy, 1989). Marital status had a protective effect towards acquiring disability in older ages. The results are consistent with the previous findings (Hébert, Brayne, & Spiegelhalter, 1999). Older adults co-residing may be dependent on others for household chaos; hence being married was also associated with a higher chance of recovery. The older adults living in the single-generation household had a higher likelihood to acquire a disability. Similar findings were visible in the previous studies that older adults living in single generation households had a higher likelihood to suffer from the disability (Schatz, Ralston, Madhavan, Collinson, & Gómez-Olivé, 2018). In a single-generation household, the older adults are not dependent on others to be taken care of financially nor in any household chaos (Schatz et al., 2018). Yet, we cannot fully dismiss the probability that disability determines living arrangements rather than living arrangements impacting disability in the present research.

Older adults from the richest wealth quintile had a higher likelihood to recover from a disability. Earlier studies concluded that older adults from lower socio-economic classes had a higher risk for activities of daily living, instrumental activities of daily living, and functional limitations (Ramsay, Whincup, Morris, Lennon, & Wannamethee, 2008). Moreover, a longitudinal analysis suggested that self-perceived income adequacy predicts the median age for onset of disability among older adults (Matthews, Smith, Hancock, Jagger, & Spiers, 2005). Additionally, it was earlier argued that treatment-seeking was higher among older adults from the richest wealth quintile (Srivastava & Gill, 2020).

Older adults from the central and southern regions were more likely to acquire a disability in comparison to those from the northern region of India. The relationship is quite spurious in the case of southern India as most of the states from southern India tops in the health index score (NITI Aayog, 2019). However, the condition of health care infrastructure is not improving in the states like Madhya Pradesh, Uttar Pradesh, and Chhattisgarh which fall into the central Indian region had low rank in health index score (NITI Aayog, 2019). The association also needs further investigation as it was found in previous studies that treatment-seeking was higher in southern states of India (Srivastava & Gill, 2020). However, the probable reason for the higher occurrence of disability among older adults in southern India may be due to a higher proportion of older adults in the respective region (Mishra, 2020).

In comparison to other literature from India, the present study backs different strengths. Firstly, we used the national representative database which contains prominent information on disability. Secondly, the panel nature of the dataset allows us to track the changes in disability status among the same individual. And provide evidence of its association with different characteristics of the elderly. The results of this study emphasize from a public health perspective, the need of the hour to focus on the growing prevalence of disability across the Indian elderly. The study had certain limitations also. The disease taken into consideration were self-reported and may include bias. Due to limited information on disability in the data, the study had restricted its analysis to certain physical limitations only. Also, the current study is unable to capture the causal effect of the association.

Conclusion

The present study focused on acquiring and recovery from disability among older adults in India from 2004-05 to 2011-12. The study emphasized the importance of considering chronic physical diseases and several socio-demographic factors that may negatively affect the trajectory of disability in older ages. Further, policymakers should develop joint programs focused on health promotion, and the development of disability prevention in the older population.

Abbreviations

1. **OR:** Odds Ratio
2. **CI:** Confidence Interval
3. **IHDS:** India Human Development Survey

4. **OBC:** Other Backward Classes
5. **SC:** Scheduled Caste
6. **ST:** Scheduled Tribe

Declarations

Ethics approval and consent to participate: The data is freely available in the public domain and survey agencies that conducted the field survey for the data collection have collected prior consent from the respondent. Therefore, prior ethical approval for using the datasets was not required.

Consent for publication: Not applicable

Availability of data and materials: The IHDS datasets used in our study can be downloaded from the Inter-University Consortium for Political and Social Research (ICPSR) data repository at <https://doi.org/10.3886/ICPSR22626.v12> and <https://doi.org/10.3886/ICPSR36151.v6>.

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Tables

Due to technical limitations, the tables are only available as a download in the supplemental files section.

Figures

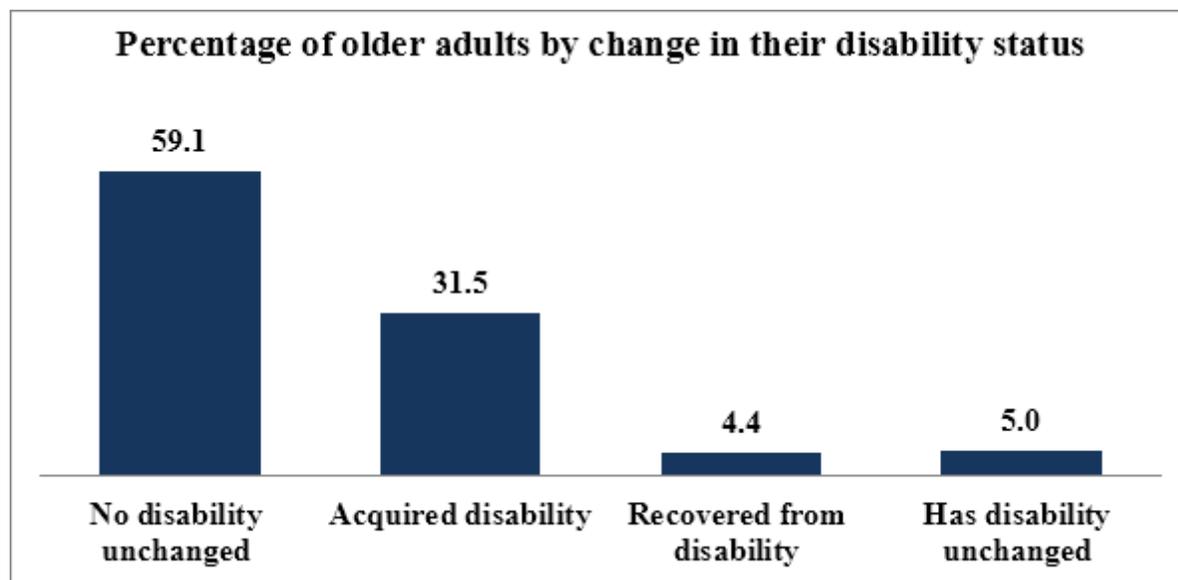


Figure 1

Bar graph showing the percentage distribution of older adults (60+ years) by the change in disability status from round-I to round-II

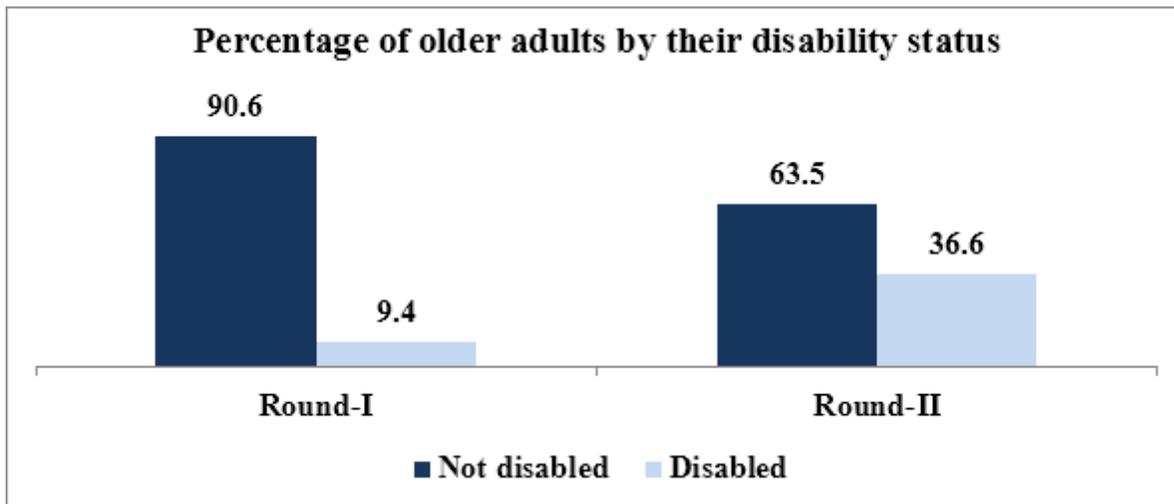


Figure 2

Bar graph showing the percentage distribution of older adults (60+ years) by the disability status during round-I and round-II respectively

Supplementary Files

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