

A snapshot of factual bitterness of elderly Indians: It's time to act

Manoj Kumar Gupta (✉ drmkgbhu@gmail.com)

All India Institute of Medical Sciences Jodhpur <https://orcid.org/0000-0002-5367-5795>

Pankaja Raghav

All India Institute of Medical Sciences Jodhpur

Vaishali Gautam

All India Institute of Medical Sciences Jodhpur

Yachana Choudhary

All India Institute of Medical Sciences Jodhpur

Nikhilesh Ladha

All India Institute of Medical Sciences Jodhpur

Research article

Keywords: ADL, DART, Depression, Dementia, Diabetes, Elderly, Fall, GDS, Geriatric, Hearing, Hypertension, Incontinence, Morbidity, Obesity, Vision

Posted Date: October 14th, 2019

DOI: <https://doi.org/10.21203/rs.2.16029/v1>

License:  This work is licensed under a Creative Commons Attribution 4.0 International License. [Read Full License](#)

Abstract

Background Elderly people suffer with diverse morbidities which comes with advancement in age. There is paucity of national and regional level studies to highlight the burden of various morbidities among elderly population in a comprehensive manner, which is of paramount importance for further fine tuning of policies and strategies for geriatric people in the country. The primary objective of the study was to screen the rural elderly people for major morbidity issues, and to find out their association with sociodemographic variables.

Methods This community based study was conducted in rural area of Jodhpur, India. WHO's 10-minute comprehensive screening tool was used for screening of geriatric giants. Other tools used were; SNELLEN chart, Dementia Assessment by Rapid Test (DART), Geriatric Depression Scale (GDS), weighing machine and stadiometer for calculating BMI, glucometer for random capillary blood sugar, and digital sphygmomanometer. Data was analyzed using SPSS v.23, and inferences were drawn using chi-square & t-test.

Results Depression and dementia were found in 45.4% and 36.2% of elderly people, respectively. Age was a significant predictor for both. Functional disability in any form was prevalent among 73.7% people. Eighteen participants were either had history of falls for ≥ 2 times in past one year or were unsteady on examination. Nearly half were having impaired hearing and/or vision. As much as 44% of the elderly were either overweight or obese. More than one third of the participants were found hypertensive. One fourth were found with >140 mg/dl random capillary blood sugar. Opium addiction was quite rampant in the study area (21.1%).

Conclusions This study provides a comprehensive picture of regional level estimate of major geriatric morbidities in India. These findings reinforce the need to reform the healthcare delivery for elderly people in India, and rethink in the direction of improving their quality of life.

Background

It is a usual saying that age is just a number for the records. But in true sense, it is the period of life when a person experiences diverse health issues due to physiological, mental, physical and biomedical changes in the body, which are quite predictable and progressive. Socially, it is the phase of life when people start feeling neglected. Epidemiological transition, improvement in availability of better health facilities and accelerated disease prevention efforts have contributed to increase in overall life expectancy, which in turn has reshaped the population pyramids by increasing the geriatric population.(1) India is predicted to become home to the second largest number of elderly persons in the world.(2) The proportion of elderly population (>60 years) in India has increased from 7.46% (76 million) to 8.6% (104 million) in past census decade (2001 to 2011), and is projected to increase up to 133 million by 2021.(3) As far as rural-urban distribution is concerned, near about 71% of the elderly persons lives in rural areas of the country.(4)

Geriatric age is one of the neglected and vulnerable phase of life. Besides having non-communicable diseases (NCDs) and age related impairments in sensory functions, elderly people also suffer from other major morbidities which comes with advancement in age like; cognitive impairment, depression, urinary incontinence, falls and physical dependence/immobility.(5–9) Deep rooted addiction habits, which were cultivated throughout the life, are also difficult to discontinue with age and people at this age have least willingness to quit the addictions as compared to other phases of the life.(10) This also poses some physical and social burden on this age group.(11)

This scenario of changing population pattern needs a completely reformed healthcare system for the welfare of elderly people in the country. Significant strides have been taken by Government of India (GoI) in this direction. The bill on Maintenance and Welfare of Parents and Senior Citizens Act (2007), National Program for the Health Care of Elderly (2011), National Policy on Senior Citizens (2011) and celebration of International day of older persons (1st October) are some of the examples of those initiatives by GoI.(12–15)

After literature search it was noticed that, there is paucity of sufficient national and regional level studies to highlight the burden of various morbidities among elderly population in a comprehensive manner, which is of paramount importance for further fine tuning of policies and strategies for geriatric people in the country. This is also required for customized improvements and better management of health-care services for this age group. With this background, this study was planned with the primary objective to screen and diagnose the major morbidity issues like; dementia, depression, urinary incontinence, falls, physical dependence/immobility, hearing and visual impairments, addictions and NCDs like; obesity, diabetes and hypertension in rural geriatric population. Other objective of the study was to find out the association of depression and dementia with sociodemographic variables.

Methods

This was a community based cross sectional study which was conducted from July 2018 to March 2019 in rural area of Jodhpur district of Rajasthan State, India. Geriatric people (>60 year) were included in the study. Based on literature search, it was found that the prevalence of various morbidities among geriatric people in India varies widely from 10% to 80%.(2,16) Considering the minimum prevalence as 10% and 5% absolute margin of error, the sample size was calculated by formula z^2pq/L^2 . Assuming 10% non-responses, the final sample size came out to be 152.

One Community Development (CD) Block was selected from ten CD Blocks of Jodhpur District by simple random sampling. The selected block (*Lun*) was divided into 3 strata (inner 1/3rd, middle 1/3rd and outer 1/3rd) by two arbitrary lines, which were drawn by equally dividing the distance of block headquarter to farthest point in the periphery of the block into three parts. Then from each stratum total enumeration of villages was done to prepare the individual sampling frames. There were total 61, 67 and 69 villages in inner 1/3rd, middle 1/3rd and outer 1/3rd circles, respectively. From each sampling frame one village was selected by simple random sampling. Thus '*Feench*', '*Dhawa*' and '*Dhundhara*' were selected for the study. Mapping and listing of households was

done of all the selected villages by a rapid survey to prepare the sampling frame of households having geriatric people. Household not having any geriatric member (60+ years) were excluded from the study. Then from the sampling frame, required number of households were selected based on Probability Proportion to Size (PPS), adopting simple random sampling. From each selected household one geriatric member was contacted for the study. The selection of participant was done by 'KISH' method where more than one geriatric people were available at home.

To find out the major morbidity issues in geriatric population, the 10-minute comprehensive screening tool from WHO's Age friendly primary health center toolkit, which is based on the principles of the active ageing policy framework was used for screening of 4 geriatric giants i.e. memory loss, depression, urinary incontinence, and falls/immobility and also for problem related to hearing and vision.(17) Risk of cognitive impairment was assessed with the help of Dementia Assessment by Rapid Test (DART).(18) Geriatric Depression Scale (GDS) was used for assessing state of depression.(19,20) All the tools were translated into vernacular and the translation was validated after retranslation with the help of language experts. To enhance the sensitivity of screening, all the tools were applied to all participants irrespective of their screening test status by 10-minute comprehensive screening tool. All those who were positive by any scale were considered positive.

Risk assessment of obesity was done by measuring weight of all the participants with the help of digital weighing machine, and height with stadiometer. Body Mass Index (BMI) was calculated and categorized as per criteria given for Asian population.(21)

Screening of diabetes was done through random capillary blood sugar measurements by glucometer (Accu-check). All the participants were screened irrespective of their previous diabetic status. Those with blood glucose more than 140 mg/dl were sensitized, counselled and referred to undergo fasting blood glucose testing at nearby Primary Health Center (PHC) or Community Health Centre (CHC) to confirm or refute the existence of diabetes mellitus in them and for further treatment.(22) Those who were found to have blood sugar between 101 to 140 were informed to undergo repeat assessment after one year. All the participants were counselled for lifestyle modifications as per the guidelines.

Blood Pressure (BP) was measured with the help of digital sphygmomanometer (Omron). Two measurements were taken for each patient, and average of those two readings was considered as final. As per Joint National Committee (JNC) 8 guidelines(23), those with systolic BP ≥ 140 millimeter of mercury (mmHg) and/or diastolic ≥ 90 mmHg, or history of treatment with anti-hypertensive agents, were declared to have hypertension and counselled to avoid tobacco use and high salt, to increase fruits and vegetables intake and encouraged to start moderate physical activity.(22) They were referred to nearby PHC/CHC for further medical management.

Data thus generated was analyzed using SPSS v.23. Appropriate tables and graphs were prepared and inferences were drawn using chi-square and t-test. P value < 0.05 was considered as statistically significant.

Results

Table 1 depicts that majority (87.5%) of the participants were in "early elderly" (>60 to <75 years) age group, while 12.5% were in "late elderly" (≥ 75 years) age group. As much as 61.8% were male and 13.2% were either unmarried or widow. Most of them (96.7%) were having children, and out of them 80.3% were living with their children at home, and 22.4% were living either alone or only with their spouse. Out of those who were having children, 17% were not able to meet their children on daily basis. Although 60% of elderly were not assisted by anybody for daily livings, yet majority (93%) were satisfied with the kind of assistance they were getting from their family.

Table 1: Sociodemographic profile and status of family support of participants (n=152)

Variable	n	%
Age		
<65	58	38.2
65-69	43	28.3
70-74	32	21.1
≥75	19	12.5
Sex		
Male	94	61.8
Female	58	38.2
Marital status		
Unmarried/widow	20	13.2
Married	132	86.8
Living with		
Alone	5	3.3
Children	118	77.6
Spouse	29	19.1
Having children	147	96.7
Frequency of meeting children (n=147)		
Daily	122	83.0
Weekly/Monthly	21	14.3
Yearly	4	2.7
Person assisting in daily living		
None	91	59.9
Children	43	28.3
Spouse	18	11.8
Assistance is sufficient	141	92.8

Table 2 depicts that, 22.4% of the elderly could not immediately recall the names of all three objects told to them. This proportion of forgetfulness was increased to 25.7% after one minute. History of urinary incontinence was positive in 8 participants, and out of them, 7 had the incontinence in last one week of the survey. They were referred to nearby health facility for clinical management. Nearly one fourth (23.7%) were affirmed that they often feel sad or depressed. Functional disability (limitation in any activity) was prevalent among 73.7% of people. Eighteen participants were referred for clinical process of managing falls, as either they had history of falls for ≥2 times in past one year or were unsteady (unable to rise from the chair and walk around it without holding on). Near about half of the elderly people were found with decreased hearing. Similar proportion of participants were having difficulty in reading or doing any of their daily activities because of the poor eyesight (even with wearing glasses), and out of them near about 90% were having decreased vision in any eye as per SNELLEN's chart.

Table 2: Mini comprehensive screening of participants for major morbidities (n=152)

Screening parameters	n	%
Memory (All 3 objects named correctly)		
Immediately	118	77.6
After one minute	113	74.3
Urinary Incontinence		
In the last year have you ever lost your urine and gotten wet	8	5.3
Have you lost urine over the past week?	7	4.6
Depression		
Do you often feel sad or depressed?	36	23.7
Physical Function capacity (immobility/unable to)		
Run/fast walk to catch the bus	83	54.6
Do heavy work around the house, like washing windows, walls or floors	84	55.3
Go shopping for groceries or clothes	40	26.3
Get to places out of walking distance	25	16.4
Bath, either a tub bath or shower	15	9.9
Dress, like putting on a shirt, buttoning and zipping, or putting on shoes	8	5.3
Limitation in any activity	112	73.7
Falls		
Fallen ≥ 2 times in the past 12 months	12	7.9
Unable to rise from the chair and walk around it without holding on	9	5.9
Unsteady	8	5.3
Referred to "clinical process of managing falls"	18	11.8
Hearing decreased		
Soft voice in right ear	70	46.1
Soft voice in left ear	72	47.4
Normal voice in right ear	19	12.5
Normal voice in left ear	21	13.8
Hearing decreased	74	48.7
Vision		
Difficulty reading or doing any of the daily activities because of eyesight	75	49.3
Decreased Vision in right eye (SNELLEN) (n=75)	62	82.7
Decreased Vision in left eye (SNELLEN) (n=75)	63	84
Decreased vision in any eye (n=75)	67	89.3

It is evident from table 3 that, almost one third of the elderly were found to have depression (score of ≥ 5) in GDS. By using DART, almost one fifth of the elderly were having higher risk of developing cognitive impairment (score of 3 or 4).

Table 3: Distribution of participants according to their Activity of Daily Living, Depression and Dementia status

	n	%
Depression by Geriatric Depression Scale (GDS)	50	32.9
Dementia Assessment by Rapid Test (DART)		
0	20	13.2
1	53	34.9
2	46	30.3
3	24	15.8
4	9	5.9

It is implied from table 4 that, total 45.4% elderly were found depressed on screening using simultaneous testing. They were referred for clinical evaluation at nearby health facility. Similarly, 36.2% of participants were having cognitive impairments and were referred for clinical evaluation.

Table 4: Net sensitivity of screening by simultaneous testing of the scales

		WHO mini comprehensive screening			p value
		Yes, n(%)	No, n(%)	Total, n(%)	
Depression					
GDS	Yes	17 (47.2)	33 (28.4)	50 (32.9)	0.036
	No	19 (52.8)	83 (71.6)	102 (67.1)	
	Total	36 (100.0)	116 (100.0)	152 (100.0)	
Dementia					
DART	Yes (score 3&4)	17 (43.6)	16 (14.2)	33 (21.7)	<0.01
	No (score 0-2)	22 (56.4)	97 (85.8)	119 (78.3)	
	Total	39 (100.0)	113 (100.0)	152 (100.0)	

Table 5 depicts that advancement in age was a significant predictor for the development of depression among elderly. Age was also significantly associated with the risk of developing cognitive impairment in elderly people. Depression and dementia were also significantly associated with each other.

Table 5: Association of depression with demographic variables, activity and dementia status

	Yes, n(%) / Mean ± SD	No, n(%) / Mean ± SD	Total, n(%) / Mean ± SD	p value
Depression				
Mean age	68.74±9.44	66.01±5.93	66.91±7.35	0.032
Sex				
Male	29 (58.0)	65 (63.7)	94 (61.8)	0.495
Female	21 (42.0)	37 (36.3)	58 (38.2)	
Marital Status				
Unmarried/widow	9 (18.0)	11 (10.8)	20 (13.2)	0.216
Married	41 (82.0)	91 (89.2)	132 (86.8)	
Dementia				
Mean Age	69.16±8.97	65.64±5.93	66.91±7.35	0.004
Sex				
Male	35 (63.6)	59 (60.8)	94 (61.8)	0.732
Female	20 (36.4)	38 (39.2)	58 (38.2)	
Marital Status				
Unmarried/widow	9 (16.4)	11 (11.3)	20 (13.2)	0.379
Married	46 (83.6)	86 (88.7)	132 (86.8)	
Depression				
Yes	32 (58.2)	37 (38.1)	69 (45.4)	0.017
No	23 (41.8)	60 (61.9)	83 (54.6)	

Table 6 illustrates that, around 44% of the elderly people were either overweight or obese, while 14.5% were underweight. More than one third (37.5%) of the participants were found hypertensive, and 39% were pre hypertensive. Eight people reported themselves as already diagnosed diabetic patients. On screening for diabetes, 25% of participants were found with >140mg/dl random capillary blood sugar. Family history of hypertension, diabetes and heart disease was positive among 13.8%, 7.2% and 0.7% participants, respectively.

Table 6: Status of NCDs and their family history among participants (n=152)

Variable	n	%
Nutritional status		
Underweight	22	14.5
Normal	63	41.4
Overweight	22	14.5
Obese	45	29.6
Self-reported Hypertension	7	4.6
Hypertension		
Normal	36	23.7
Pre Hypertensive	59	38.8
Stage I HT	37	24.3
Stage II HT	20	13.2
Self-reported Diabetes	8	5.2
Random Blood Sugar		
≤100	25	16.4
101-140	89	58.6
>140	38	25.0
Family history of NCDs		
Hypertension	21	13.8
Diabetes	11	7.2
Heart disease	1	0.7
Dementia	0	0

Opium addiction was predominantly higher (21.1%) among elderly people in the study area. Fourteen participants were smokers and around two third were smoking ≥ 10 cigarettes/bidi per day. As much as 14.5% participants were addicted to tobacco chewing. (table 7)

Table 7: Distribution of participants according to their history of addictions (n=152)

Addiction history	n	%
Opium	32	21.1
Smoking	14	9.2
Tobacco chewing	22	14.5
Frequency of opium consumption per day (n=32)		
Once	18	56.3
Twice	8	25.0
Thrice or more	6	18.7
Number of cigarettes/bidi smoke per day (n=14)		
<10	5	35.6
≥ 10	9	64.3
Packets of tobacco chewed per day (n=22)		
1	11	50
2	3	13.6
>2	8	36.2

Discussion

India has already been assigned the label of “an ageing nation”.(24) This is the time when country will have to contemplate for the welfare of people who are in this irreversible physiological process. To boost healthy ageing in the country, it is necessary to have the national and regional level comprehensive morbidity profiles of elderly people of the country to draw attention of policy makers and planners in this direction. WHO 10-minute comprehensive screening tools is a quick way of screening for major geriatric giants. The importance of this tool and its validation has already been proved by Huang L-K et.al (2015). (25)

Dementia

The epidemic of dementia is going to be a highly predictable consequence of epidemiological and demographic transition in India.(26) Currently there is no recommendation for routinely screening the elderly people for cognitive impairments in India. But, it is a proven fact that this follows the iceberg phenomenon and under-detection of dementia is quite high.(27) In the present study, around one third of the elderly were found to have cognitive impairment. Wide variations in the level of dementia (0.9% to 25%) have been reported by different studies across India.(28–30)

Age was found as a significant contributor in developing cognitive impairment. Effect of age on dementia has also been demonstrated by many authors. (28,29,31,32) Contrary to the findings of the present study, many authors have reported female gender as a significant predictor of memory loss.(28,29,31) A deep rooted combined culture of patriarchy and hierarchy in Indian culture (especially North India) forces females into a persistent discrimination phase starting from childhood, which build up a constant stress among them, and ultimately leads to cognitive impairments.(33)

In the present study, dementia was significantly associated with depression. Li Ge et.al (2011) has proved the temporal association between these two disorders and demonstrated that depression in old age may be an early manifestation of dementia rather than increasing risk for dementia.(34) Although similar kind of significant association was observed by many researchers, yet it has been declared a complex relationship due to lack of sufficient scientific evidences.(35–37)

Urinary Incontinence (UI)

Urinary incontinence is a condition which has a profound effect on wellbeing and quality of life of elderly people.(38–40) The International Continence Society has signified UI as a social problem.(41) In the present study 5.3% of the elderly people were having positive history of UI. Recent studies from India show a prevalence of 9% to 40%, which is quite contrasting from the findings of the present study.(39,42–45) These variations may be attributed to use of different definitions, diversity in screening tools, heterogeneity of study populations, and population sampling procedures.

Depression

Although old age is not a phase of life which is always filled with sadness and depression, yet there are some challenges at this age, which are difficult to cope in effective manner and play an important role in the development of depression or other mental disorders among elderly people. In the present study the self-reported depression was present among almost one fourth of the elderly people. This is in accordance to the findings reported by Bishwajit G et.al (2017).(46) As much as 45% of the elderly people were found depressed in the present study. These finding are supported by many systematic reviews of Indian studies published in previous two decades.(47–49)

Age was a significant predictor of depression among elderly people. A significant positive correlation of depression with age has also been highlighted by many authors in different parts of India.(50–53) At the same time there are studies which have denied this association at the level of statistical significance. (54–56) Females had higher prevalence of depression as compared to males in this study, but this association was not significant. Although this finding is supported by literature(50,53), yet a significant association of female gender with the risk of depression has also been emphasized by many authors. (47,48,54)

Functional Disability

Physical dependency leads to decline in physical activities of daily living, and thereby reduction in interaction with social environment. Inability to do even small activities of daily living independently (like grooming himself) can have serious repercussions on physical and mental health. This in turn also increases the risk of depression among elderly people.(57–60) In the present study, nearly three fourth of the elderly were facing limitations in functional Activities of Daily Living (ADL). Variable findings in this regard has been reported from different parts of the country, which ranges from 35% to 65%.(61–65)

Falls

Falls in geriatric age group is a kind of unintentional injuries, which leads to disabilities and impair functional activities of daily living, and ultimately affects the quality of life.(66) Nearly 12% of the elderly were found unsteady in the present study, and 8% were having positive history of fall ≥ 2 times in last one year. This finding is in accordance to the findings stated by Sharma P.K. et.al (2017), who has reported history of a fall in last 12 months among 13% South Indian elderly.(67) A Review of Indian epidemiological studies published in last decade denoted the prevalence of fall ranging from 26% to 37% across various regions of the country.(68)

Hearing and visual impairments

Vision and hearing are important senses of the body for proprioception and wayfinding.(69) The significant association of decreased hearing and vision with increased propensity of fall has already been proved by many authors. (68,70,71) In the present study, 44% of the elderly people were found with visual impairment and nobody was completely blind. This finding fits in the range of visual impairment reported among elderly people in India by many authors

(20%-65%).(24,72–78). About half of the elderly people were found with decreased hearing. Bright T et.al. (2019) found this prevalence as 34.7% in South India.(79) Analysis of 2011 Indian census data denotes that hearing impairment contributes 19% disability burden in the elderly.(80)

Obesity & Underweight

Obesity and underweight are considered as two edges of a sword. Obesity can be considered as 'welcome sign' of development of NCDs, has a significant association with increasing age.(81) Although it is proven fact that obesity increases the risk of several chronic diseases(82), yet its association with increased risk of mortality among elderly people is still controversial.(83,84) Underweight, which is other edge of the sword, is associated with poor self-rated health, cognition and quality of life among elderly in India.(85)

In the present study, 44% of the elderly were overweight or obese and around 15% were underweight. Recent studies in different geographical locations of the country have highlighted the prevalence of overweight/obesity among elderly between 23% to 70%, and underweight between 26% to 38%.(85–87) These variations in findings are due to use of different cutoffs of BMI for overweight/obesity. The association of underweight and with

Hypertension (HTN)

Hypertension has been declared as silent killer by WHO and identified as one of the most significant risk factors for morbidity and mortality worldwide.(88) In the present study, 39% of the participants were pre hypertensive and 37.5% were hypertensive. Reddy B.M. et.al (2018) found 83.5% hypertension among oldest old (80+ years) people in South India.(89) Tripathy JP et.al (2017) observed 36.3% pre-hypertension and 59.7% HTN among 45-69 age group people in North India.(90) Kapil U. et.al (2018) found 54.5% HTN among geriatric population living in a high-altitude region of North India.(91) Singh S. et.al (2017) reported 13% pre hypertension and 40% hypertension among 55-64 age group people from Central India.(92) Bhise MD et.al (2017) depicted 40.7% hypertension among 60+ people in Western India.(93) Family history of hypertension was positive among 13.8% of elderly in the present study. This is quite lower than the finding (44.7%) reported by Singh S. et.al (2017).(92)

Diabetes

Glucose metabolism depends on adequate insulin secretion from the pancreas and appropriate sensitivity of insulin receptors. This fluctuates with increasing age due to impaired secretion of insulin as well as receptor sensitivity. In the present study, 25% of the participants were found with >140mg/dl random capillary blood sugar. Kapil U et.al (2018) and Tripathy J.P. et.al (2017) reported the prevalence of diabetes as 14.6% and 18%, respectively among geriatric population in North India.(91,94) Large differences in diabetes prevalence between different states of India has also been highlighted by famous ICMR-INDIAB study.(95) Family history of diabetes was positive among 7.2% of the participants. Suvarna P. et.al (2019) has reported this figure as 45% exclusively among diabetic patients.(96)

Addictions

Serving opium on special occasions and its consumption in social gatherings is a long-standing custom of western Rajasthan.(97) But gradually this tradition has now been converted into severe addiction among people. Opium addiction was predominantly higher (21.1%) among elderly people in the study area. This finding can be supported by widely published literature on Opium addiction in Rajasthan.(98–101) Habit of smoking and tobacco chewing among elderly in the study area was relatively less compared to reported figures from various parts of the country.(50,102–104)

Conclusions

This study provides a comprehensive picture of regional level estimate of major geriatric morbidities in India. This is quite evident that, all the four geriatric giants i.e. cognitive impairment, depression, urinary incontinence, and falls/immobility were quite prevalent in the study area. Age was a significant predictor for depression and dementia. Sensory impairments (hearing and visual) were moderately at higher level. Opium addiction was quite rampant among elderly people. Most of the findings, including prevalence of NCDs were in accordance to the published literature in Indian context. These findings reinforce the need to reform the healthcare delivery for elderly people in India, and rethink in the direction of improving their quality of life.

Abbreviations

ADL: Activities of Daily Living

BMI: Body Mass Index

CD Block: Community Development Block

CHC: Community Health Centre

DART: Dementia Assessment by Rapid Test

GDS: Geriatric Depression Scale

HTN: Hypertension

JNC: Joint National Committee

NCDs: Non-Communicable Diseases

PHC: Primary Health Centre

PPS: Probability Proportion to Size

UI: Urinary Incontinence

WHO: World Health Organization

Declarations

Ethics approval and consent to participate: The study was approved by Institutional Ethics Committee of All India Institute of Medical Sciences (AIIMS) Jodhpur (certificate reference number: AIIMS/IEC/2018/1084, dated 19th March 2018). Informed consent was taken from the respondents before attempting the questionnaire.

Consent for publication: Not Applicable

Availability of data and materials: The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request

Competing interests: The authors declare that they have no competing interests

Funding: None

Authors' contributions: "The concept of the study was developed by MKG. study was designed by MKG and NL. Data collection, formal statistical analysis, interpretations and manuscript development and review were done by all authors. All authors read and approved the final manuscript."

Acknowledgements: None

References

1. Lee SB, Oh JH, Park JH, Choi SP, Wee JH. Differences in youngest-old, middle-old, and oldest-old patients who visit the emergency department. *Clin Exp Emerg Med.* 2018;5(4):249–55.
2. Konda PR, Sharma PK, Gandhi AR, Ganguly E. Correlates of Cognitive Impairment among Indian Urban Elders. *J Gerontol Geriatr Res.* 2018;7(6):489.
3. Census of India Website: Office of the Registrar General & Census Commissioner, India [Internet]. [cited 2019 Sep 17]. Available from: <http://www.censusindia.gov.in/>
4. Elderly in India: Profile and Programs [Internet]. Central Statistics Office Ministry of Statistics and Programme Implementation Government of India; 2016. Available from: http://mospi.nic.in/sites/default/files/publication_reports/ElderlyinIndia_2016.pdf
5. Lewandowicz A, Skowronek P, Maksymiuk-Kłós A, Piątkiewicz P. The Giant Geriatric Syndromes Are Intensified by Diabetic Complications. *Gerontol Geriatr Med [Internet].* 2018 [cited 2019 Sep 18];4. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6291866/>
6. Bartoszek A, Niedorys B, Szalast K. Geriatric giants among the elderly. 2019;9(4):367–74.
7. Nagoor K, Darivemula SB, Reddy NB, Patan SK, Deepthi CS, Chittooru CS. Prevalence of mental illness and their association with sociodemographic factors in the rural geriatric population in Chittoor, Andhra Pradesh, India: A community-based study. *J Educ Health Promot.* 2018;7:165.
8. Pitchai P, Dedhia HB, Bhandari N, Krishnan D, D'Souza NRJ, Bellara JM. Prevalence, risk factors, circumstances for falls and level of functional independence among geriatric population - A descriptive study. *Indian J Public Health.* 2019;63(1):21–6.
9. Tripathy JP. Geriatric care in India: A long way to go. *J -Life Health.* 2014;5(4):205–6.
10. Reddy MM, Kanungo S, Naik BN, Kar SS. Willingness to quit tobacco smoking and its correlates among Indian smokers – Findings from Global Adult Tobacco Survey India, 2009–2010. *J Fam Med Prim Care.* 2018;7(6):1353–60.
11. Meijer E, Kampman M, Geisler MS, Chavannes NH. "It's on everyone's plate": a qualitative study into physicians' perceptions of responsibility for smoking cessation. *Subst Abuse Treat Prev Policy.* 2018;13:48.
12. Ministry of Social Justice and Empowerment - Government of India [Internet]. [cited 2019 Sep 18]. Available from: <http://socialjustice.nic.in/Home/SiteSearch?Search=faq>
13. National Programme for Health Care of the Elderly(NPHCE) | National Health Portal of India [Internet]. [cited 2019 Sep 18]. Available from: [https://www.nhp.gov.in/national-programme-for-health-care-of-the-elderly\(nphce\)_pg](https://www.nhp.gov.in/national-programme-for-health-care-of-the-elderly(nphce)_pg)
14. National Policy for Senior Citizens, Press Information Bureau, Government of India [Internet]. [cited 2019 Sep 18]. Available from: <https://pib.gov.in/newsite/erelease.aspx?relid=77868>
15. International Day of Older Persons 2018 | National Health Portal of India [Internet]. [cited 2019 Sep 18]. Available from: https://www.nhp.gov.in/international-day-of-older-persons-2018_pg
16. Paul NSS, Asirvatham M. Geriatric health policy in India: The need for scaling-up implementation. *J Fam Med Prim Care.* 2016;5(2):242–7.

17. Age-friendly Primary Health Care Centres Toolkit [Internet]. WHO; 2008. Available from: www.who.int
18. Swati B, Sreenivas V, Manjari T, Ashima N. Dementia Assessment by Rapid Test (DART): An Indian Screening Tool for Dementia. *J Alzheimer's Dis Park*. 2015;5(3):1000198.
19. Yesavage JA, Brink TL, Rose TL, Lum O, Huang V, Adey M, et al. Development and validation of a geriatric depression screening scale: A preliminary report. *J Psychiatr Res*. 1982;17(1):37–49.
20. Benedetti A, Wu Y, Levis B, Wilchesky M, Boruff J, Ioannidis JPA, et al. Diagnostic accuracy of the Geriatric Depression Scale-30, Geriatric Depression Scale-15, Geriatric Depression Scale-5 and Geriatric Depression Scale-4 for detecting major depression: protocol for a systematic review and individual participant data meta-analysis. *BMJ Open*. 2018;8(12):e026598.
21. World Health Organization. Redefining Obesity and its treatment: The Asia-Pacific perspective: [Internet]. 2000 [cited 2019 Sep 18]. Available from: https://apps.who.int/iris/bitstream/handle/10665/206936/0957708211_eng.pdf
22. National Centre for Disease Control & NPCDCS. Training Module for Medical Officers for Prevention, Control and Population Level Screening of Hypertension, Diabetes and Common Cancer (Oral, Breast & cervical) [Internet]. MoHFW, Government of India; 2017. Available from: <https://mohfw.gov.in/sites/default/files/Training%20Module%20for%20Medical%20Officers%20for%20Prevention%2C%20Control%20and%20Population>
23. James PA, Oparil S, Carter BL, Cushman WC, Dennison-Himmelfarb C, Handler J, et al. 2014 evidence-based guideline for the management of high blood pressure in adults: report from the panel members appointed to the Eighth Joint National Committee (JNC 8). *JAMA*. 2014;311(5):507–20.
24. Baldev VF, Chopra R, Batra N, Singh S. Pattern of Ocular Morbidity in the Elderly Population of Northern India. *J Clin Diagn Res JCDR*. 2017;11(8):NC20–3.
25. Huang L-K, Wang Y-W, Chou C-H, Liu Y-L, Hsieh J-G. Application of a World Health Organization 10-minute screening tool in eastern Taiwan—Falls and self-rated health status among community-dwelling elderly. *Tzu Chi Med J*. 2015;27(3):120–3.
26. Sathianathan R, Kantipudi SJ. The dementia epidemic: Impact, prevention, and challenges for India. *Indian J Psychiatry*. 2018;60(2):165.
27. Lang L, Clifford A, Wei L, Zhang D, Leung D, Augustine G, et al. Prevalence and determinants of undetected dementia in the community: a systematic literature review and a meta-analysis. *BMJ Open*. 2017;7(2):e011146.
28. Patel RM, Singh US. Prevalence Study of Cognitive Impairment and its Associated Sociodemographic Variables using Mini-Mental Status Examination among Elderly Population Residing in Field Practice Areas of a Medical College. *Indian J Community Med Off Publ Indian Assoc Prev Soc Med*. 2018;43(2):113–6.
29. Maroof M, Ahmad A, Khalique N, Ansari MA, Shah MS, Eram U. Prevalence and determinants of cognitive impairment among rural elderly population of Aligarh. 2016;7(3):189–92.
30. Shaji KS, Jithu VP, Jyothi KS. Indian research on aging and dementia. *Indian J Psychiatry*. 2010;52(Suppl1):S148–52.
31. Poddar K, Kant S, Singh A, Singh TB. An epidemiological study of dementia among the habitants of eastern Uttar Pradesh, India. *Ann Indian Acad Neurol*. 2011;14(3):164–8.
32. Sharma D, Mazta SR, Parashar A. Prevalence of cognitive impairment and related factors among elderly: A population-based study. *J Dr NTR Univ Health Sci*. 2013;2(3):171.
33. Lee J, Shih R, Feeney K, Langa KM. Gender disparity in late-life cognitive functioning in India: findings from the longitudinal aging study in India. *J Gerontol B Psychol Sci Soc Sci*. 2014;69(4):603–11.
34. Li G, Wang LY, Shofer JB, Thompson ML, Peskind ER, McCormick W, Bowen JD, Crane PK, Larson EB. Temporal relationship between depression and dementia – findings from a large community-based 15 year follow-up study. 2011;68(9):970–7.
35. Byers AL, Yaffe K. Depression and Risk of Developing Dementia. *Nat Rev Neurol*. 2011;7(6):323–31.
36. Snowden MB, Atkins DC, Steinman LE, Bell JF, Bryant LL, Copeland C, et al. Longitudinal Association of Dementia and Depression. *Am J Geriatr Psychiatry Off J Am Assoc Geriatr Psychiatry*. 2015;23(9):897–905.
37. Muliayala KP, Varghese M. The complex relationship between depression and dementia. *Ann Indian Acad Neurol*. 2010;13(Suppl2):S69–73.
38. Sims J, Browning C, Lundgren-Lindquist B, Kendig H. Urinary incontinence in a community sample of older adults: prevalence and impact on quality of life. *Disabil Rehabil*. 2011;33(15–16):1389–98.
39. Biswas B, Bhattacharyya A, Dasgupta A, Karmakar A, Mallick N, Sembiah S. Urinary Incontinence, Its Risk Factors, and Quality of Life: A Study among Women Aged 50 Years and above in a Rural Health Facility of West Bengal. *J -Life Health*. 2017;8(3):130–6.
40. Talarska D, Tobis S, Kotkowiak M, Strugała M, Stanisławska J, Wieczorowska-Tobis K. Determinants of Quality of Life and the Need for Support for the Elderly with Good Physical and Mental Functioning. *Med Sci Monit Int Med J Exp Clin Res*. 2018;24:1604–13.
41. Abrams P, Andersson KE, Birder L, Brubaker L, Cardozo L, Chapple C, et al. Fourth International Consultation on Incontinence Recommendations of the International Scientific Committee: Evaluation and treatment of urinary incontinence, pelvic organ prolapse, and fecal incontinence. *Neurourol Urodyn*. 2010;29(1):213–40.
42. Murukesu RR, Singh DKA, Shahar S. Urinary incontinence among urban and rural community dwelling older women: prevalence, risk factors and quality of life. *BMC Public Health*. 2019;19(Suppl 4):529.
43. Mohd Sidik S. The Prevalence of Urinary Incontinence among the Elderly in a Rural Community in Selangor. *Malays J Med Sci MJMS*. 2010;17(2):18–23.
44. Prem NN, Chatterjee P, Chakrawarty A, Dey AB. URINARY INCONTINENCE AMONG OLDER INDIANS: ASSESSMENT AND IMPACT ON QUALITY OF LIFE. *Innov Aging*. 2017;1(Suppl 1):612–3.
45. Milsom I, Gyhagen M. The prevalence of urinary incontinence. *Climacteric*. 2019;22(3):217–22.

46. Bishwajit G, O'Leary DP, Ghosh S, Yaya S, Shangfeng T, Feng Z. Physical inactivity and self-reported depression among middle- and older-aged population in South Asia: World health survey. *BMC Geriatr.* 2017;17:100.
47. Pilania M, Yadav V, Bairwa M, Behera P, Gupta SD, Khurana H, et al. Prevalence of depression among the elderly (60 years and above) population in India, 1997–2016: a systematic review and meta-analysis. *BMC Public Health.* 2019;19:832.
48. Grover S, Malhotra N. Depression in elderly: A review of Indian research. *J Geriatr Ment Health.* 2015;2:4–15.
49. Barua A, Ghosh MK, Kar N, Basilio MA. Prevalence of depressive disorders in the elderly. *Ann Saudi Med.* 2011;31(6):620–4.
50. Rathod MS, Dixit JV, Goel AD, Yadav V. Prevalence of Depression in an Urban Geriatric Population in Marathwada Region of Western India. *Indian J Psychol Med.* 2019;41(1):32–7.
51. Swarnalatha N. The Prevalence of Depression among the Rural Elderly in Chittoor District, Andhra Pradesh. *J Clin Diagn Res JCDR.* 2013;7(7):1356–60.
52. Sengupta P, Benjamin AI. Prevalence of depression and associated risk factors among the elderly in urban and rural field practice areas of a tertiary care institution in Ludhiana. *Indian J Public Health.* 2015;59(1):3–8.
53. B Sangma RJ, Konjengbam S, Laishram J, Elangbam V. Depression and its associated risk factors among elderly in an urban area: A cross-sectional study. *J Med Soc.* 2018;32(2):106–10.
54. Buvneshkumar M, John KR, Logaraj M. A study on prevalence of depression and associated risk factors among elderly in a rural block of Tamil Nadu. *Indian J Public Health.* 2018;62(2):89–94.
55. Konda PR, Sharma PK, Gandhi AR, Ganguly E. Geriatric Depression and its Correlates among South Indian Urbans. *J Depress Anxiety.* 2018;7(4):314.
56. Goyal A, Kajal KS. Prevalence of depression in elderly population in the southern part of Punjab. *J Fam Med Prim Care.* 2014;3(4):359–61.
57. Mullick TH, Samanta S, Maji B, Sarangi L. Pattern of morbidity and depression among the urban geriatric population: A community-based survey in Bhubaneswar, Orissa, India. *Int J Health Allied Sci.* 2018;7(4):233–9.
58. Ono M, Kono Y, Aoyagi Y, Tsuji Y, Ishikawa A, Sugiura T, et al. The clinical impact of depressive symptom on ADL score in elderly patients with respiratory disease. *Jpn J Compr Rehabil Sci.* 2018;9:29–33.
59. Xie H, Chen P-W, Zhao L, Sun X, Jia X-J. Relationship between activities of daily living and depression among older adults and the quality of life of family caregivers. *Front Nurs.* 2018;5(2):97–104.
60. Dao ATM, Nguyen VT, Nguyen HV, Nguyen LTK. Factors Associated with Depression among the Elderly Living in Urban Vietnam. *BioMed Res Int.* 2018;2018:2370284.
61. Keshari P, Shankar H. Prevalence and spectrum of functional disability of urban elderly subjects: A community-based study from Central India. *J Fam Community Med.* 2017;24(2):86–90.
62. Parmar MC, Saikia N. Chronic morbidity and reported disability among older persons from the India Human Development Survey. *BMC Geriatr.* 2018;18:299.
63. Medhi GK, Sarma J, Pala S, Bhattacharya H, Bora PJ, Visi V. Association between health related quality of life (HRQOL) and activity of daily living (ADL) among elderly in an urban setting of Assam, India. *J Fam Med Prim Care.* 2019;8(5):1760–4.
64. Srinivasan K, Vaz M, Thomas T. Prevalence of health related disability among community dwelling urban elderly from middle socioeconomic strata in Bangaluru, India. *Indian J Med Res.* 2010;131:515–21.
65. Srivastava MR, Srivastava JP, Gupta P, Sachan B, Bhardwaj P, Choudhary S. Activities of daily living score and sociodemographic profile among elderly in rural and urban areas of Lucknow city. *Int J Adv Res.* 2014;2(3):473–82.
66. Lopes K, Costa D, Santos L, Castro D, Bastone A. Prevalência do medo de cair em uma população de idosos da comunidade e sua correlação com mobilidade, equilíbrio dinâmico, risco e histórico de quedas. *Braz J Phys Ther.* 2009;13(3):223–9.
67. Sharma PK, Bunker CH, Singh T, Ganguly E, Reddy PS, Newman AB, et al. Burden and Correlates of Falls among Rural Elders of South India: Mobility and Independent Living in Elders Study. *Curr Gerontol Geriatr Res.* 2017;2017:1290936.
68. Joseph A, Kumar D, Bagavandas M. A Review of Epidemiology of Fall among Elderly in India. *Indian J Community Med Off Publ Indian Assoc Prev Soc Med.* 2019;44(2):166–8.
69. Campos JL, Butler JS, Bühlhoff HH. Multisensory integration in the estimation of walked distances. *Exp Brain Res.* 2012;218(4):551–65.
70. Krishnaiah S, Ramanathan RV. Impact of blindness due to cataract in elderly fallers: findings from a cross-sectional study in Andhra Pradesh, South India. *BMC Res Notes.* 2018;11:773.
71. Jindal HA, Duggal M, Jamir L, Sharma D, Kankaria A, Rohilla L, et al. Mental health and environmental factors associated with falls in the elderly in North India: A naturalistic community study. *Asian J Psychiatry.* 2019;39:17–21.
72. Vignesh D, Gupta N, Kalaivani M, Goswami AK, Nongkynrih B, Gupta SK. Prevalence of visual impairment and its association with vision-related quality of life among elderly persons in a resettlement colony of Delhi. *J Fam Med Prim Care.* 2019;8(4):1432–9.
73. Gupta N, Vashist P, Malhotra S, Senjam SS, Misra V, Bhardwaj A. Rapid assessment of visual impairment in urban population of Delhi, India. *PloS One.* 2015;10(4):e0124206.
74. Vijaya L, George R, Asokan R, Velumuri L, Ramesh SV. Prevalence and causes of low vision and blindness in an urban population: The Chennai Glaucoma Study. *Indian J Ophthalmol.* 2014;62(4):477–81.
75. Neena J, Rachel J, Praveen V, Murthy GVS, Rapid Assessment of Avoidable Blindness India Study Group. Rapid Assessment of Avoidable Blindness in India. *PloS One.* 2008;3(8):e2867.

76. Murthy GVS, Vashist P, John N, Pokharel G, Ellwein LB. Prevalence and Causes of Visual Impairment and Blindness in Older Adults in an Area of India with a High Cataract Surgical Rate. *Ophthalmic Epidemiol.* 2010 Aug;17(4):185–95.
77. Malhotra S, Vashist P, Kalaivani M, Gupta N, Senjam SS, Rath R, et al. Prevalence and causes of visual impairment amongst older adults in a rural area of North India: a cross-sectional study. *BMJ Open.* 2018;8(3):e018894.
78. Barua K, Borah M, Deka C, Kakati R. Morbidity pattern and health-seeking behavior of elderly in urban slums: A cross-sectional study in Assam, India. *J Fam Med Prim Care.* 2017;6(2):345–50.
79. Bright T, Mactaggart I, Kuper H, Murthy GV, Polack S. Prevalence of Hearing Impairment in Mahabubnagar District, Telangana State, India. *Ear Hear.* 2019;40(1):204–12.
80. Velayutham B, Kangusamy B, Joshua V, Mehendale S. The prevalence of disability in elderly in India - Analysis of 2011 census data. *Disabil Health J.* 2016;9(4):584–92.
81. Palo SK, Swain S, Priyadarshini S, Behera B, Pati S. Epidemiology of obesity and its related morbidities among rural population attending a primary health centre of Odisha, India. *J Fam Med Prim Care.* 2019;8(1):203–8.
82. Nyberg ST, Batty GD, Pentti J, Virtanen M, Alfreðsson L, Fransson EI, et al. Obesity and loss of disease-free years owing to major non-communicable diseases: a multicohort study. *Lancet Public Health.* 2018;3(10):e490–7.
83. Ng TP, Jin A, Chow KY, Feng L, Nyunt MSZ, Yap KB. Age-dependent relationships between body mass index and mortality: Singapore longitudinal ageing study. *PloS One.* 2017;12(7):e0180818.
84. McKee A, Morley JE. Obesity in the Elderly. In: Feingold KR, Anawalt B, Boyce A, Chrousos G, Dungan K, Grossman A, et al., editors. *Endotext* [Internet]. South Dartmouth (MA): MDText.com, Inc.; 2000 [cited 2019 Sep 24]. Available from: <http://www.ncbi.nlm.nih.gov/books/NBK532533/>
85. Selvamani Y, Singh P. Socioeconomic patterns of underweight and its association with self-rated health, cognition and quality of life among older adults in India. *PLoS ONE.* 2018;13(3):e0193979.
86. Naik BN, Kar SS, Majella MG, Nachiappan DS. Overweight and obesity among elderly in an urban slum of Puducherry: A facility-based descriptive study. *CHRISMED J Health Res.* 2018;5:137–42.
87. Gupta A, Kapil U, Khandelwal R, Khenduja P, Sareen N, Pandey RM, et al. Prevalence and risk factors of underweight, overweight and obesity among a geriatric population living in a high-altitude region of rural Uttarakhand, India. *Public Health Nutr.* 2018;21(10):1904–11.
88. WHO | A global brief on hypertension [Internet]. WHO. [cited 2019 Sep 25]. Available from: https://www.who.int/cardiovascular_diseases/publications/global_brief_hypertension/en/
89. Reddy BM, Ganguly E, Sharma PK. Hypertension and its Correlates in the Oldest Old Population Aged 80 Years and Above in Urban South India. *J Gerontol Geriatr Res.* 2018;7(3):472.
90. Tripathy JP, Thakur JS, Jeet G, Chawla S, Jain S. Alarming high prevalence of hypertension and pre-hypertension in North India-results from a large cross-sectional STEPS survey. Li Y, editor. *PLOS ONE.* 2017;12(12):e0188619.
91. Kapil U, Khandelwal R, Ramakrishnan L, et al. Prevalence of hypertension, diabetes, and associated risk factors among geriatric population living in a high-altitude region of rural Uttarakhand, India. 2018;7(6):1527–36.
92. Singh S, Shankar R, Singh GP. Prevalence and Associated Risk Factors of Hypertension: A Cross-Sectional Study in Urban Varanasi. *Int J Hypertens.* 2017;2017:5491838.
93. Bhise MD, Patra S. Prevalence and correlates of hypertension in Maharashtra, India: A multilevel analysis. *PLoS ONE.* 2018 Feb 5;13(2):e0191948.
94. Tripathy JP, Thakur JS, Jeet G, Chawla S, Jain S, Pal A, et al. Prevalence and risk factors of diabetes in a large community-based study in North India: results from a STEPS survey in Punjab, India. *Diabetol Metab Syndr.* 2017 Jan 23;9:8.
95. Anjana RM, Deepa M, Pradeepa R, Mahanta J, Narain K, Das HK, et al. Prevalence of diabetes and prediabetes in 15 states of India: results from the ICMR-INDIAB population-based cross-sectional study. *Lancet Diabetes Endocrinol.* 2017;5(8):585–96.
96. Suvama P, Shruti K, Maruti D, Charudatta J. Diabetes in the Kokan region of India. *World J Diabetes.* 2019;10(1):37–46.
97. R'sthan in a bind over tradition, addiction [Internet]. *Deccan Herald.* 2014 [cited 2019 Sep 24]. Available from: <https://www.deccanherald.com/content/435541/rsthan-bind-over-tradition-addiction.html>
98. Malviya A, Negi N, Mandora M, Yadav JK. Perioperative Status and Complications in Opium Addicts in Western Rajasthan. *Indian J Surg.* 2011;73(5):346–51.
99. Ganguly KK, Sharma HK, Krishnamachari KA. An ethnographic account of opium consumers of Rajasthan (India): socio-medical perspective. *Addict Abingdon Engl.* 1995;90(1):9–12; discussion 13-21.
100. Purohit P, Nebhinani N, Sharma P. Evaluation of Antioxidant Status, High Sensitivity C-reactive Protein, and Insulin Resistance in Male Chronic Opiate Users Without Comorbidities. *Indian J Psychol Med.* 2017;39(3):299–305.
101. Lakshminarayana J, Singh MB. Opium Addiction among Rural Population in Desert Districts of Western Rajasthan: Some Observations from the Study. *J Hum Ecol.* 2009;25(1):1–4.
102. Goswami A, Reddaiah VP, Kapoor SK, Singh B, Dwivedi SN, Kumar G. Tobacco and alcohol use in rural elderly Indian population. *Indian J Psychiatry.* 2005;47(4):192–7.
103. Bhattacharyya H, Pala S, Medhi GK, Sarkar A, Roy D. Tobacco: Consumption pattern and risk factors in selected areas of Shillong, Meghalaya. *J Fam Med Prim Care.* 2018;7(6):1406–10.

Figures

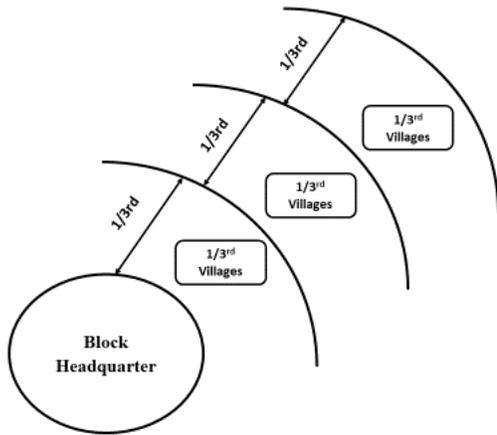


Figure 1

CD Block