

# HEALTHCARE AT ARM'S LENGTH: EXPLORING THE ASSOCIATION OF DISTANCE AND THE HOUSEHOLD WEALTH INDEX IN ODISHA, INDIA

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## ABSTRACT

### INTRODUCTION:

Location or distance from healthcare facilities affects the use of health facilities by households. The use of health facilities also have an impact on the socioeconomic conditions. Distance from healthcare facilities significantly affects catastrophic health expenditures. This study aimed to determine the association of physical distance to healthcare facilities with the economic deprivation of households.

### OBJECTIVE:

This study aims to analyze the distance of healthcare facilities from households in different wealth index categories of Odisha. The study argues that the household wealth index is associated with the distance to healthcare facilities.

### METHODOLOGY:

This study is based on six purposively selected districts in Odisha: Rayagada, Kalahandi, Angul, Keonjhar, Khordha, and Kendrapara in India. A cross-sectional household survey was conducted to collect the data. A total of 902 household data points were collected. Data analysis was carried out using SPSS version 25.

### RESULTS:

A difference is observed among households that need to travel more than one hour to reach a private doctor or private hospital: 42.6% of poor households face this challenge, whereas only 25% of wealthy households do. Among those who cannot reach a public hospital in less than an hour, a larger proportion are from poor households (62.6%). The poor and wealthy segments of the population have nearly equal access to NGO-run healthcare facilities in terms of proximity. We observe that poor households are less likely than wealthy households to reach private pharmacists in less than an hour and are more likely to require over an hour to reach them.

## CONCLUSION:

Ensuring healthcare facilities is the minimum requirement within one hour of reach for every household in India. Underreporting of illnesses and diseases is one of the major factors of high mortality in the population. Physical accessibility to healthcare facilities can reduce the mortality burden on the population.

## KEYWORDS

Distance, Healthcare facilities, Hospitals, Pharmacies, NGO-run facilities, Odisha

## INTRODUCTION

The distance between patients' homes and healthcare facilities significantly impacts their access to and utilization of healthcare services, particularly among socioeconomically disadvantaged populations. This review synthesizes research findings on how distance to healthcare facilities interacts with various factors to influence health outcomes, healthcare utilization, and patient satisfaction.

With increasing distance, the cost of access to healthcare facilities increases. Cost can be best measured by the time spent reaching a facility. Delayed consultation is an outcome of long distances from the pediatric rheumatology center [1]. A greater travel distance increases the risk of more comorbidities, which leads to a greater duration of hospitalization. Referral healthcare institutions attract more patients who travel longer distances, as regional healthcare institutions do not have specialized care [2]. Patients prefer a lesser distance of their home from the hospital as well as the availability of suitable transport to reach the facility and the likelihood of their being able to return by the same evening after their encounter with the hospital is over [3]. Efficient healthcare facility utilization depends on proximity to the facility in addition to increased patient–doctor interaction and laboratory services [4].

Relatives of mentally ill patients feel morally obligated to visit patients at care facilities. However, visitors face challenges due to geographical distance along with other social and professional commitments [5].

Antimicrobial resistance (AMR) is a global silent pandemic [6]. Ensuring effective, accessible diagnostic networks is critical for diagnosing, monitoring and preventing AMR. This wide network of healthcare facilities is not present in most low- and middle-income countries [7].

Distance from healthcare facilities can be highly important in the context of road accidents, as it may impact the survival outcome for crash victims [8]. In poisoning cases, many deaths can be averted by immediate access to health services along with improved case management [9].

The reproductive healthcare needs of women critically depends on multiple factors, such as doctor availability, waiting time, cleanliness, privacy and affordability. Among these factors, service proximity is the utmost requirement [10]. The special newborn care unit (SNCU) can be effective when it is closer to the homes of mothers and newborns with adequate support from back-referral transport facilities [11]. In cases of abortion, safe abortion is compromised because abortion facilities are far away [12]. Distance has some common companions who challenge patients and the healthcare system. Banerjee and others [13] postulated that long waiting times, affordability, poor quality of care, attitudes of health workers, poor transportation facilities, a lack of infrastructure together with distance, challenges the rural population and urban slum dwellers in accessing primary health care services. This directly hampers equitable distribution and access principles [13–15]. However, patients prefer to travel distance if doctor–patient interactions are informal and if the quality of care is good [16].

HIV patients travel more than 30 km for antiretroviral therapy (ART), as it benefits patients. However, long distances from facilities lead to nonadherence in many cases [17,18]. Forgetfulness, running out pills, alcohol abuse, perceived stigma, depressive symptoms, and fear of side effects are other complementary factors of HIV-ART treatment nonadherence [18].

Compared with non-SC/ST groups, deprived and vulnerable population groups such as SC and ST groups are

located farthest from healthcare facilities [19]. The status of SC/ST women is even worse than that of SC/ST men in terms of reaching reproductive health services compared with their counterparts [20].

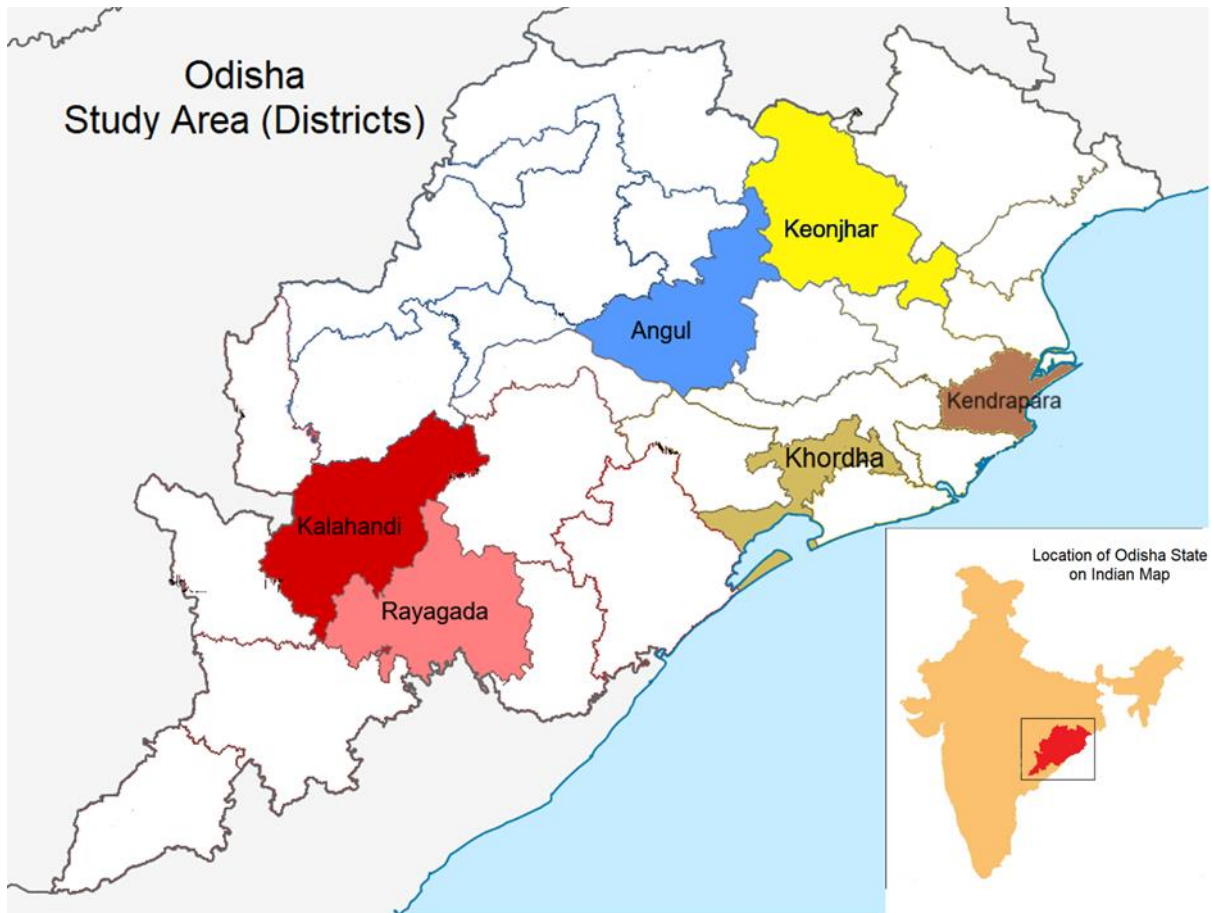
This paper aims to analyze primary data to determine the relationship between healthcare facility distance and household economic conditions in Odisha.

## MATERIALS AND METHODS

The study is based on six purposively selected districts in Odisha: Rayagada, Kalahandi, Angul, Keonjhar, Khordha, and Kendrapara.

The six purposively selected districts represent southern, northern, and coastal Odisha. The three regions have three different types of economic identity. Rayagada and Kalahandi are southern Odisha's tribal population-dominated regions where households mostly depend on primary activities to earn their livelihood and are economically deprived compared with other districts of the province. North Odisha is represented by Angul and Keonjhar districts. These two districts are known for coal and iron ore mining. Household income is relatively good in this region. The coastal regions of Khordha and Kendrapara depend on the service sector, where several public and private corporations are active (Figure 1).

FIGURE 1: STUDY AREA



Note: Map not to scale, only for representation purposes

### SAMPLING

The sample size was calculated via the following formula:  $n = z^2 pq/d^2$  (where  $z = 1.96$ ,  $p =$  prevalence of OOP expenditure on medicines (55.8%),  $q = 1-p$ ,  $d =$  design effect (0.035)) [21]

After adding 20% for nonresponses, the sample size was estimated to be 928. Households were chosen as the research unit. A multistage cluster sampling design was adopted. A total of 902 households were surveyed in six

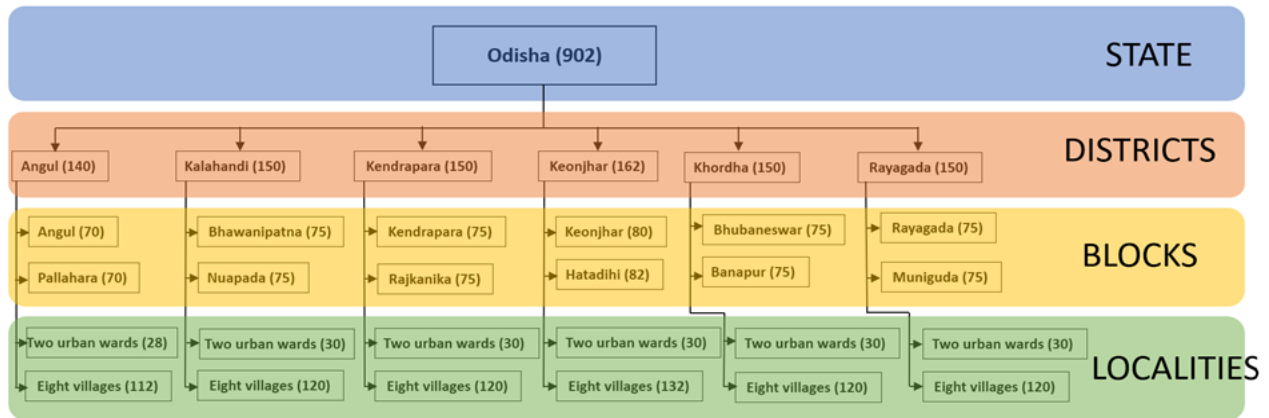
districts of Odisha. Twenty-six surveys were discarded because of incomplete responses.

A stratified random sampling procedure was adopted to select the locations and households. In the six selected districts of Odisha, samples were collected. One hundred fifty-five households from each block were surveyed per the estimated sample size (Figure 2). Owing to nonresponse and other challenges, the samples collected were slightly

affected and adjusted. Two blocks were selected from each district: one block, which is district headquarters, and another block, which is situated remotely from the district headquarters. The number of households surveyed in each block was almost the same. A selected block is divided into five different localities, where one urban ward is chosen with four villages. An urban ward is where an administrative

unit such as town Panchayat, Nagarpalika, or cantonment board is situated. From four different directions (north, south, east, and west), four villages were purposively selected. In the selected localities, households were randomly selected. A door-to-door household survey was carried out.

**FIGURE 2: SAMPLING AND DATA COLLECTION TECHNIQUES**



### INCLUSION-EXCLUSION CRITERIA

Households were residents of the localities for at least the last five years. A minimum of two family members should reside in a house. The respondent must be eighteen years and above. The respondent should actively participate and contribute to the household. Irrespective of whether a patient or affected person was in the house (with acute or chronic illness/disease), all the randomly selected households had an equal chance of being surveyed.

### APPROACH TO THE FIELD

The survey took place from October 2022 to February 2023. Three field investigators collected the data. The World Health Organization's (WHO) 'Manual for the Household Survey to Measure Access to Use of Medicines' [22] was used to develop a structured household questionnaire. A structured household questionnaire was used to collect the data. A total of 902 household data points were collected. Data analysis was carried out in SPSS version 25 and Microsoft Excel.

### ANALYSIS

Four types of health facilities are chosen to investigate the relationship between distance and household economic status: private doctor/hospital, public hospital, NGO-healthcare facility, and private pharmacist. Household economic status is measured through the household wealth index. The wealth index is prepared via the World Food Program guidance paper on the creation of a wealth

index (Hjelm et al., 2017). The procedure included a list of household items, types of houses and crowding data in the principal component analysis (PCA) to draw the wealth index. Three household categories were created: poor-category households, middle-category households, and wealthy-category households. The independent variables were the time required to reach a private doctor/hospital, public hospital, NGO-healthcare facility, and private pharmacist. The time to reach is categorized into three categories: less than one hour (<1 hour), do not know, and more than one hour (>1 hour).

### RESULTS

Among the total sample of 902 participants, 60.2% were male, and 39.8% were female. The mean age of the participants was 42 ± 12.87 years. The largest group of participants (41.1%) were educated up to primary school. At the same time, the second largest group (30.2%) was those who were illiterate or never attended school. The secondary, higher secondary, and graduation-passed populations formed 28.7% of the total sample. Household heads constituted 64.6% of the respondents, whereas spouses constituted 25.3%. Female-headed households accounted for 14.1% of the total sample. A total of 53.8% of the households had only one earning person, while 30.8% of the total sample had two earning members. At the same time, nearly 10.3% of the households mentioned that there

was no earning member in the household. The main occupation that helped households earn a livelihood was daily wage labor (27.7%). The percentage of agricultural labor was 18.8%, while that of farmers was 16.7%. The social group composition revealed that 35% were scheduled tribes (STs), 27.3% were other backward castes (OBCs), 23% were general, and only 14.5% were scheduled castes (SCs).

The dependent variable in this study is the household wealth index. There is a negative correlation between household wealth and healthcare facility distance. This means that the greater the distance between healthcare facilities is the lower the wealth index score of the household. The correlation is significant for all three facilities except private doctors/hospitals.

**TABLE 1. DEMOGRAPHIC CHARACTERISTICS OF THE RESPONDENTS**

Characteristics	Categories	Frequency	Percentage	Total
Age	18-40	469	52.0	902
	41-60	354	39.2	
	60+	79	8.8	
Mean Age	42 ± 12.87			
Sex	Male	543	60.2	902
	Female	359	39.8	
Education	No schooling/illiterate	272	30.2	902
	Primary	371	41.1	
	Secondary	133	14.7	
	Higher secondary	62	6.9	
	Graduation	64	7.1	
Occupation	Daily wage labor□	250	27.7	902
	Agricultural labor□	170	18.8	
	Farmer	151	16.7	
	Small shop/business	116	12.9	
	Unemployed	91	10.1	
	Other	124	13.7	
Social groups	Scheduled tribes	316	35	902
	Other backward castes	247	27.3	
	General	208	23	
	Scheduled castes	131	14.5	
Rural–Urban	Rural	744	82.5	902
	Urban	158	17.5	

**TABLE 2: CORRELATIONS BETWEEN THE DISTANCE OF HEALTHCARE FACILITIES AND THE HH WEALTH INDEX**

	HH wealth index	Significance
Private doctor/hospital	-0.059	0.076
Public hospital	-0.209**	0.000
NGO-run facility	-0.161**	0.000
Private pharmacist	-0.295**	0.000

\*\* Correlation is significant at the 0.01 level (2-tailed)

Private doctors or private hospitals were accessible within an hour for all wealth categories, and the frequencies and percentages were similar across each group. However, a difference is observed among households that need to

travel more than an hour to reach a private doctor or private hospital: 42.6% of poor households face this challenge, whereas only 25% of wealthy households do.

Unlike private doctors or hospitals, public hospitals are government healthcare facilities where service charges are nominal. Public hospitals are accessible by 595 (66%) households out of 902 in less than one hour. However, those who are unable to reach this area in less than one hour constitute a greater portion of poor households (62.6%). More wealthy households (36.6%) than poor households (30.4%) access public hospitals in less than one hour.

NGO-run facilities are not for-profit organisations. Their aim is to benefit the underprivileged groups in the population. However, the poor and wealthy sections of the population are served almost equally in terms of proximity to NGO-run healthcare facilities. Sixty percent of poor households travel more than an hour to reach NGO-run facilities, whereas only 3.6% of wealthy households face this situation.

Private pharmacists are reachable in less than one hour by 473 (52.4%) households out of 902. Compared with wealthy households, poor households are less likely to reach private pharmacists in less than one hour and more likely to reach them in more than one hour.

Concerning the "do not know" responses, the average number of poor households across all healthcare facilities in this dataset is 123. The middle class has an average "do not know" response of 133, whereas wealthy households have an average response of 146.75 across facilities.

The chi-square test is statistically significant for all four types of healthcare facility access by different wealth index categories of households.

**TABLE 3: ASSOCIATION BETWEEN HEALTHCARE FACILITIES AND THE HOUSEHOLD WEALTH INDEX**

Healthcare facilities	Categories	Household wealth index categories			Total	Chi-square
		Poor	Middle	Wealthy		
Private doctor/hospital	Less than an hour	126 (33.6)	123 (32.8)	126 (33.6)	375 (100)	p<0.05
	Do not know	96 (28.3)	115 (33.9)	128 (37.8)	339 (100)	
	More than an hour	80 (42.6)	61 (32.4)	47 (25)	188 (100)	
Public hospital	Less than an hour	181 (30.4)	196 (32.9)	218 (36.6)	595 (100)	p<0.01
	Do not know	44 (23.9)	60 (32.6)	80 (43.5)	184 (100)	
	More than an hour	77 (62.6)	43 (35)	3 (2.4)	123 (100)	
NGO-run facility	Less than an hour	23 (39.7)	13 (22.4)	22 (37.9)	58 (100)	p<0.01
	Do not know	228 (30)	256 (33.7)	276 (36.3)	760 (100)	
	More than an hour	51 (60.7)	30 (35.7)	3 (3.6)	84 (100)	
Private pharmacist	Less than an hour	112 (23.7)	165 (34.9)	196 (41.4)	473 (100)	p<0.01
	Do not know	124 (37.8)	101 (30.8)	103 (31.4)	328 (100)	
	More than an hour	66 (65.3)	33 (32.7)	2 (2)	101 (100)	

Note: Frequences outside parenthesis and percentages inside parenthesis

## DISCUSSION

The negative relationship between healthcare facility distance and the household wealth index indicates that a greater distance from healthcare facilities may lead to poorer household wealth scores. There are repercussions of

being situated far from healthcare facilities. For example, high transportation costs, increased comorbidities and the spread of noncommunicable diseases (NCDs) in low- and middle-income countries have increased [1,2,23].



Private pharmacists are the first point of contact for illnesses in communities because they save consultation fees and travel expenses [24]. However, these benefits are only possible when private pharmacists are present in the vicinity. The present study revealed that private pharmacists are far from poor households.

Poor households in remote areas generally do not have access to healthcare services. A private pharmacy in a neighborhood could prompt a response to the lack of basic facilities in rural areas [25]. There are also informal healthcare providers who serve in remote rural areas [26]. Their role needs to be scrutinized, and their services can be formally accommodated.

The data indicate that middle- and wealthy households are less likely to know the approximate distance to a healthcare facility than poor households are. This could be because distance is less of a concern for upper-class households, as they have greater access to affordable transportation options than poor households do. The advantages of wealthy households are well recognized in terms of health outcomes by Shahid and others [27].

## CONCLUSION

Distance to healthcare facilities is a critical determinant of healthcare access, particularly for socioeconomically disadvantaged populations. Low proximity to healthcare services is one of the major factors that constitute better access to healthcare. Addressing high distance to healthcare facilities requires a multifaceted approach, including improving transportation infrastructure, enhancing the availability of local healthcare services, and ensuring that high-quality care is accessible to all, regardless of geographic location. Such measures are essential for reducing health disparities and improving overall health outcomes for vulnerable populations.

Quality and affordable healthcare services are supposed to be at arm's length for every citizen. Innovative models of basic healthcare provisions can be emphasized to meet this objective. For example, the public-private partnership model of pharmacies. One such model already functions in India and is known as Pradhan Mantri Bhartiya Janaushadhi Pariyojana (PMBJP). There is a need to revolutionize the spread of such pharmacies across India. Remote and rural areas need cost-effective connectivity to advanced centers of healthcare facilities across India. At

the regional level, public hospitals must be accessible within one hour.

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## CONFLICT OF INTEREST:

None

## ETHICAL APPROVAL:

Was obtained from the University of Hyderabad ethical clearance committee.

## CONSENT TO PARTICIPATE:

A written consent was obtained from participants before beginning the study.

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