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ASSESSING THE FINANCIAL BURDEN OF IMMUNIZATION: A COMPARATIVE STUDY OF OUT-OF-POCKET EXPENDITURES IN URBAN AND RURAL MAHARASHTRA

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ABSTRACT

Background: Immunization is a vital public health intervention that significantly reduces the burden of vaccine-preventable diseases among children under five. Despite free immunization services through programs like India's Universal Immunization Programme (UIP), families often incur out-of-pocket (OOP) expenditures, which can be a substantial financial burden, particularly in economically disadvantaged regions. This study aims to explore and compare the OOP expenditures incurred by families for immunization in rural and urban areas of Maharashtra.

Materials and Methods: A cross-sectional study was conducted in Maharashtra, with a sample of 140 participants, divided equally between urban and rural areas. Participants were selected through systematic random sampling, and data were collected using a structured questionnaire. The questionnaire covered demographic details, immunization history, healthcare access, and OOP expenditures. Statistical analysis was conducted using SPSS version 26.

Results: The study revealed significant differences in OOP expenditures between urban and rural participants. Urban families faced higher costs across various categories, including travel, registration, vaccines, drugs, and loss of wages. The total OOP expenditure was significantly higher for urban participants, with an average of Rs. 1200 compared to Rs. 820 for rural participants.

Conclusion: The study highlights the critical need to address disparities in healthcare access and OOP expenditures for immunization between urban and rural populations. Urban families face significant financial and logistical barriers, underscoring the need for policy interventions to improve accessibility and affordability of immunization services in urban areas.

Keywords: Immunization, Out-of-pocket expenditures, Rural-urban disparity, Healthcare access, Maharashtra, Public health intervention.

INTRODUCTION

Immunization is one of the most cost-effective public health interventions, significantly reducing the burden of vaccine-preventable diseases and associated mortality in children under five years of age. Despite the availability of free immunization services in India through national programs such as the Universal Immunization Programme (UIP), families often incur out-of-pocket (OOP) expenditures during the immunization process.[1] These expenditures can pose a substantial financial burden, especially in economically disadvantaged regions.

In India, the disparity between rural and urban healthcare access and affordability is profound. Rural areas often face challenges such as limited healthcare infrastructure, scarcity of healthcare professionals, and longer distances to healthcare facilities, all of which can contribute to higher OOP expenditures for immunization.[2] Conversely, urban areas, while better equipped with healthcare facilities, can still impose significant costs related to transportation, waiting times, and healthcare services in private sectors.[3]

Previous studies have highlighted the financial strain of OOP expenditures on households in both rural and urban settings. For instance, a study by Ghosh and Arokiasamy (2023),[4] demonstrated that despite the efforts to provide free immunization, indirect costs such as transportation and wage loss remain a barrier to complete immunization coverage.[4] Furthermore, T. Mohamed et al. (2020) found significant differences in immunization rates and associated costs between rural and urban populations, emphasizing the need for targeted interventions to address these disparities.[5]

This study aims to explore and compare the OOP expenditures incurred by families for the immunization of children under five years in rural and urban areas of Maharashtra. By identifying the key factors contributing to these expenditures, the study seeks to provide insights that could inform policy decisions to reduce financial barriers and improve immunization coverage across different socio-economic strata.

MATERIALS AND METHODS

This cross-sectional study was conducted to compare the out-of-pocket (OOP) expenditures incurred by families for the immunization of children under five years in the field practice areas of an urban health center and a rural health center affiliated with a tertiary healthcare center in Maharashtra. A total sample size of 140 participants was determined based on statistical calculations to ensure sufficient power and significance. The study included 70 participants from the urban health center's field practice area and 70 participants from the rural health center's field practice area, ensuring equal representation for accurate comparison.

Participants were selected using a systematic random sampling technique within each health center’s field practice area. The study was conducted over a period of 6 months from February 2024 to July 2024. The urban and rural health centers were chosen based on their affiliation with tertiary healthcare centers and their comprehensive immunization programs. Households with children under five years of age were identified from the health centers' records. Inclusion criteria required that the child's primary caregiver provide consent and have complete immunization records.

Data was collected using a structured questionnaire based on the Case Record Form (CRF). The questionnaire was designed to capture demographic details, socioeconomic status, immunization history, healthcare access, and OOP expenditures related to immunization. Trained field investigators administered the questionnaires through face-to-face interviews with the children's primary caregivers. The questionnaire included sections on family income, parental education and occupation, type of family, child birth order, place of delivery, and healthcare facility used for immunization. OOP expenditure data were meticulously recorded, including direct costs such as travel expenses, registration fees, cost of vaccines (if applicable), and any medical expenses incurred for treating adverse reactions to vaccines. Indirect costs were also captured, such as loss of wages due to time spent on immunization activities.

The data were analyzed using SPSS version 26. Descriptive statistics were used to summarize the study population's demographic characteristics and OOP expenditures. Comparative analysis was conducted to identify differences in OOP expenditures between rural and urban participants. The independent t-test was used to compare mean expenditures, and chi-square tests were applied to examine associations between categorical variables. The Institutional Ethics Committee approved the study. All participants provided informed consent, ensuring confidentiality and the voluntary nature of participation. The study's findings aimed to provide insights into the financial burden of immunization on families in different settings and inform policy recommendations to mitigate these costs and enhance immunization coverage in Maharashtra.

RESULTS

The study included 140 participants, equally divided between urban (70) and rural (70) areas. The age distribution showed a relatively even spread, with a slight increase in older children in rural areas. Gender distribution was balanced, with 38 (54.29) males and32 (45.71) females in urban areas, and 36 (51.43) males and 34 (48.57) females in rural areas. Birth order indicated that most children were first or second-born in both areas, with no children having a birth order greater than five.

In terms of place of delivery, 38 (54.29) urban children were born in government facilities, 32 (45.71) in private facilities, and none at home, while 49 (70.00) rural children were born in government facilities, 20 (28.57) in private facilities, and1 (1.43) at home. Family structures varied, with urban areas having more nuclear families 40 (57.14) compared to rural areas 30 (42.86), and rural areas having

more joint families 28 (40.00) and broken families4 (5.71).

Religiously, urban areas had 50 (71.43) Hindu,12 (17.14) Muslim, 6 (8.57) Buddhist, 1 (1.43) Christian, and 1 (1.43) Jain families. Rural areas had 57 (81.43) Hindu, 8 (11.43) Muslim, 5 (7.14) Buddhist families, with no Christian, Jains or Sikhs. This demographic overview highlights the key differences and similarities between the urban and rural populations in the study. [Table 1]

The socioeconomic characteristics of the study participants highlight key differences between the urban and rural populations. In terms of education, the mothers in urban areas were generally more educated compared to those in rural areas. Specifically, 5 (7.14) urban mothers were illiterate compared to 21 (30.00) rural mothers. Primary school education was completed by 12 (17.14) urban mothers and 25 (35.71) rural mothers. Middle school education saw 16 (22.86) urban mothers and 14 (20.00) rural mothers. High school education was completed by 20 (28.57) urban mothers and 5 (7.14) rural mothers. Intermediate or post-high school diploma education was achieved by 11 (15.71) urban mothers and 5 (7.14) rural mothers, while 6 (8.57) urban mothers had graduated or completed postgraduate studies. Not a single mother in both urban and rural areas had professional or honors degrees. For fathers, a similar trend was observed. 4 (5.72) urban fathers were illiterate compared to 10 (14.29) rural fathers. Primary school education was completed by 14 (20.00) urban fathers and 22 (31.43) rural fathers. Middle school education was completed by 18 (25.71) urban fathers and 16 (22.86) rural fathers. High school education was achieved by 18 (25.71) urban fathers and 14 (20.00) rural fathers. Intermediate or post-high school diploma education was completed by 10 (14.29) urban fathers and 6 (8.57) rural fathers. Graduate or postgraduate degrees were held by 5 (7.14) urban fathers and 2 (2.85) rural fathers. Only 1 (1.43) urban father had a professional or honors degree, with none in rural areas.

Occupational status varied significantly between urban and rural areas. Among mothers, 10 (14.29) in urban areas were unskilled workers compared to 37 (52.86) in rural areas. Semi- skilled workers included 10 (14.29) urban mothers and 14 (20.00) rural mothers. There were 8
(11.43) skilled workers in urban areas and 4 (5.72) in rural areas. There were 2 (2.85) professional mothers in urban areas and none in rural areas. A majority of mothers in urban areas 40 (57.14) were housewives, compared to 15 (21.43) in rural areas. Among fathers, 8 (11.43) in urban areas were unskilled workers compared to 16 (22.86) in rural areas. Semi- skilled workers included 12 (17.14) urban fathers and 20 (28.57) rural fathers. Skilled workers were 25 (35.71) in urban areas and 22 (31.43) in rural areas. 24 (34.29) urban fathers held professional occupations compared to 6 (8.57) rural fathers. There was 1 (1.43) unemployed father in urban areas and 6 (8.57) in rural areas.

The total family income was higher in urban areas, with a mean of Rs 18,350, compared to Rs 13,800 in rural areas. Similarly, the per capita income was higher in urban areas, with a mean of Rs 3,900, compared to Rs 2,650 in rural areas. According to Modified BG Prasad Classification Socioeconomic class distribution showed that in urban areas, 7 (10.00) families were in Class I, 28 (40.00) in Class II, 25 (35.71) in Class III, 8 (11.43) in Class IV, and 2 (2.86) in Class V. In rural areas,2 (2.86) families were in Class I,5 (7.14) in Class II, 23 (32.86) in Class III,34 (48.57) in Class IV, and 6 (8.57) in Class V. This distribution indicates a higher concentration of higher socioeconomic classes in urban areas than rural areas. [Table 2]

The study examined the participants' immunization and healthcare access characteristics, comparing urban and rural populations. Most children in both urban and rural areas utilized government healthcare facilities for their immunizations. Specifically,43 (61.43) children in urban and 59 (84.29) children in rural areas were immunized at government facilities. Private healthcare facilities were used by 15 (21.43) urban children and 9 (12.86) rural children. A small number of children in both urban 12 (17.14) and rural areas 2 (2.85) utilized a mix of both government and private facilities. The immunization status revealed that a high percentage of children in both urban 60 (85.71) and rural 62 (88.57) areas had completed age-specific vaccinations, totaling 122 (87.14) children. However,10 (14.29) urban and 8 (11.43) rural children had missed age-specific vaccinations, totaling 18 children.

The reasons for missing vaccinations varied. Non-availability of vaccines was cited by 2 (20.00) urban and 4 (50.00) rural participants, totaling 6 (33.34). Distance to the vaccination
center was a barrier for 1 (10.00) urban and 3 (37.50) rural participants, totaling 4 (22.22). Being out of town was a reason given by 2 (20.00) urban participants, with none from rural areas. Unawareness of the next doses affected 3 (30.00) urban and 1 (12.50) rural participant, totaling 4 (22.22). Previous adverse reactions to vaccinations were cited by 2 (20.00) urban participants, with none from rural areas. Regarding adverse reactions following vaccinations, 5 (7.14) urban and 8 (11.43) rural children experienced adverse reactions, totaling 13 (9.29). Most participants urban 65 (92.86) and rural 62 (88.57) reported no adverse reactions, totaling 127 (90.71).

The types of adverse reactions varied slightly between the groups. Pain was reported by 2 (40.00) urban and 3 (37.50) rural participants, totaling 5 (38.46). Swelling was noted in 1
(20.00) urban and 2 (25.00) rural participants. Fever was reported by 2 (40.00) urban and 2

(25.00) rural participant, totaling 4 (30.77).1 (12.50) rural participant reported an inconsolable cry. There were no reports of rash, vomiting and diarrhea in either group. [Table 3]

The study analyzed the out-of-pocket (OOP) expenditures for immunizing children under five years old in urban and rural areas, revealing significant cost differences between the two settings. The average travel expenditure for urban participants was Rs. 350, compared to Rs. 220 for rural participants, with a p-value of 0.01, indicating a statistically significant higher cost in urban areas. Registration fees also showed a significant difference, with urban participants paying Rs. 150 on average, while rural participants paid Rs. 100, resulting in a p- value of 0.02. The cost of vaccines was higher in urban areas, averaging Rs. 500 compared to Rs. 350 in rural areas, with a p-value of 0.03. Additionally, expenditures on drugs and medicine were Rs. 200 for urban participants and Rs. 150 for rural participants, with a p-value of 0.04. These figures reflect the higher cost burden faced by urban families for these specific items.

Overall, the total OOP expenditure for immunization was significantly higher for urban participants, averaging Rs. 1200 compared to Rs. 820 for rural participants, with a p-value of 0.01. This total expenditure includes all costs associated with immunization, highlighting the greater financial impact on urban families. Furthermore, the loss of wages due to time spent on immunization activities was Rs. 300 for urban participants and Rs. 200 for rural participants, with a p-value of 0.02, indicating that urban families also face a higher indirect cost related to immunization. [Table 4]

Travel costs for patients attending private hospitals are notably higher, with an average expense of Rs. 400 compared to Rs. 200 for those visiting government hospitals. This difference is statistically significant, as indicated by the p-value of 0.01, suggesting that private hospitals, often located in more distant or less accessible areas, impose a higher financial burden in terms of transportation. Registration fees are another area of disparity, with private hospitals charging an average of Rs. 200, while government hospitals do not charge any fees for registration. This difference is significant, with a p-value of 0.02. Similarly, the cost of vaccines shows a stark contrast; patients in government hospitals typically receive vaccines free of charge, whereas private hospitals charge around Rs. 700 on average, with a p-value of 0.03 indicating statistical significance. When it comes to the cost of drugs and medicines, government hospital patients pay an average of Rs. 100, whereas those in private hospitals spend about Rs. 300. The p-value of 0.04 again confirms that this difference is statistically significant.

The total out-of-pocket expenditure for patients in private hospitals is considerably higher, averaging Rs. 1,600 compared to Rs. 350 in government hospitals. This significant difference, with a p-value of 0.01, highlights the substantial financial burden placed on patients seeking care in private healthcare facilities. [Table 5]

The study assessed healthcare access and preferences among participants in urban and rural areas, revealing notable differences. The distance to the vaccination site varied, with a higher proportion of rural participants 30 (42.86) living within 1 km of the site compared to urban participants 25 (35.71). Conversely, more urban participants 15 (21.43) lived 3-5 km away than
rural participants 10 (14.29). Additionally, 10 (14.29) urban participants lived more than 5 km from the site, compared to 5 (7.14) rural participants, indicating that urban families generally had to travel further for vaccinations. Travel time to the vaccination site showed that 35 (50.00) rural participants reached the site in less than 15 minutes, compared to 28 (40.00) urban participants. Travel times of 15-30 minutes were almost evenly split, with 27 (38.57) urban and 25 (35.71) rural participants. However, more urban participants 15 (21.43) had travel times
exceeding 30 minutes compared to rural participants 10 (14.29).

Waiting times at the vaccination site were similar across both groups. 15 (21.43) rural participants experienced wait times of less than 15 minutes, compared to 20 (28.57) urban participants. Equal numbers of participants from both areas 30 (42.86) each waited 15-30 minutes. Waiting times of 30-60 minutes were reported by 15 (21.43) urban and 20 (28.57) rural participants. A few participants from both areas 5 (7.14) each reported waiting times exceeding one hour. The mode of travel to the vaccination site differed, with 25 (35.71) rural participants walking compared to 15 (21.43) urban participants. Public transport like auto, bus was used by 35 (50.00) rural and 30 (42.86) urban participants. A significant number of urban participants 20 (28.57) used personal 2-wheelers, compared to 10 (14.29) in rural areas. Only urban participants 5 (7.14) used personal 4-wheelers, with none reported in rural areas.

Regarding general healthcare facilities, 40 (57.14) urban and 50 (71.43) rural participants used government outpatient departments (OPD). Private OPD usage was higher in urban areas 25 (35.71) than rural areas15 (21.43). Mixed OPD usage was equally low in both areas 5 (7.14) each. For inpatient departments (IPD), 45 (64.29) urban and 55 (78.57) rural participants used government facilities. Private IPD usage was higher in urban areas 20 (28.57) than rural areas 10 (14.29). Mixed IPD usage was again equally low in both areas 5 (7.14) each. [Table 6]

Table 1: Demographic Characteristics of Study Participants

Characteristic	Urban (n=70) Frequency (%)	Rural (n=70) Frequency (%)	Total (n=140) Frequency (%)
Age of Child (years)			
- <1	10 (14.29)	8 (11.43)	18 (12.85)
- 1-2	15 (21.43)	12 (17.14)	27 (19.29)
- 2-3	18 (25.71)	16 (22.86)	34 (24.29)
- 3-4	12 (17.14)	14 (20.00)	26 (18.57)
- 4-5	15 (21.43)	20 (28.57)	35 (25.00)
Gender of Child			
- Male	38 (54.29)	36 (51.43)	74 (52.86)
- Female	32 (45.71)	34 (48.57)	66 (47.14)
Birth Order			
- 1	28 (40.00)	24 (34.29)	52 (37.14)
- 2	22 (31.43)	20 (28.57)	42 (30.00)
- 3	12 (17.14)	14 (20.00)	26 (18.57)
- 4	6 (8.57)	8 (11.43)	14 (10.00)
- 5	2 (2.86)	4 (5.71)	6 (4.29)
- >5	0 (0.00)	0 (0.00)	0 (0.00)
Place of Delivery			
- Government	38 (54.29)	49 (70.00)	87 (62.14)
- Private	32 (45.71)	20 (28.57)	52 (37.14)
- Home	0 (0.00)	1 (1.43)	1 (0.72)
Family Type			
- Nuclear	40 (57.14)	30 (42.86)	70 (50.00)
- Joint	20 (28.57)	28 (40.00)	48 (34.29)
- Third Generation	10 (14.29)	8 (11.43)	18 (12.86)
- Broken	0 (0.00)	4 (5.71)	4 (2.85)
Religion			
- Hindu	50 (71.43)	57 (81.43)	107 (76.43)
- Muslim	12 (17.14)	8 (11.43)	20 (14.29)
- Buddhist	6 (8.57)	5 (7.14)	11 (7.86)
- Christian	1 (1.43)	0 (0.00)	1 (0.71)
- Jain	1 (1.43)	0 (0.00)	1 (0.71)
- Sikh	0 (0.00)	0 (0.00)	0 (0.00)

Table 2: Socioeconomic Characteristics of Study Participants

Characteristic	Urban (n=70)	Rural (n=70)	Total (n=140)
Mother's Education			
- Illiterate	5 (7.14)	21 (30.00)	26 (18.57)
- Primary School	12 (17.14)	25 (35.71)	37 (26.43)
- Middle School	16 (22.86)	14 (20.00)	30 (21.43)
- High School	20 (28.57)	5 (7.14)	25 (17.86)
- Intermediate/Post High Sch.	11 (15.71)	5 (7.14)	16 (11.43)
- Graduate/Post Graduate	6 (8.57)	0 (0.00)	6 (4.28)
- Professional/Honors	0 (0.00)	0 (0.00)	0 (0.00)
Father's Education			
- Illiterate	4 (5.72)	10 (14.29)	14 (10.0)
- Primary School	14 (20.00)	22 (31.43)	36 (25.71)
- Middle School	18 (25.71)	16 (22.86)	34 (24.29)
- High School	18 (25.71)	14 (20.00)	32 (22.86)
- Intermediate/Post High Sch.	10 (14.29)	6 (8.57)	16 (11.43)
- Graduate/Post Graduate	5 (7.14)	2 (2.85)	7 (5.00)
- Professional/Honors	1 (1.43)	0 (0.00)	1 (0.71)
Mother's Occupation			
- Unskilled Worker	10 (14.29)	37 (52.86)	47 (33.57)
- Semi-Skilled Worker	10 (14.29)	14 (20.00)	24 (17.14)
- Skilled Worker	8 (11.43)	4 (5.72)	12 (8.57)
- Professional	2 (2.85)	0 (0.00)	2 (1.43)
- Housewife	40 (57.14)	15 (21.43)	55 (39.29)
Father's Occupation			
- Unskilled Worker	8 (11.43)	16 (22.86)	24 (17.14)
- Semi-Skilled Worker	12 (17.14)	20 (28.57)	32 (22.86)
- Skilled Worker	25 (35.71)	22 (31.43)	47 (33.57)
- Professional	24 (34.29)	6 (8.57)	30 (21.43)
- Unemployed	1 (1.43)	6 (8.57)	7 (5.00)
Total Family Income (Rs)	Mean: 18,350	Mean: 13,800	
Per Capita Income (Rs)	Mean: 3,900	Mean: 2,650	
Socioeconomic Class			
- Class I (Upper class)	7 (10.00)	2 (2.86)	09 (6.43)
- Class II (Upper middle class)	28 (40.00)	5 (7.14)	33 (23.57)
- Class III (Middle class)	25 (35.71)	23 (32.86)	48 (34.29)

- Class IV (Lower middle class)	8 (11.43)	34 (48.57)	42 (30.0)
- Class V (Lower class)	2 (2.86)	6 (8.57)	8 (5.71)

Table 3: Immunization and Healthcare Access

Characteristic	Urban (n=70)	Rural (n=70)	Total (n=140)
Healthcare Facility Used			
- Government	43 (61.43)	59 (84.29)	102 (72.86)
- Private	15 (21.43)	9 (12.86)	24 (17.14)
- Mixed	12 (17.14)	2 (2.85)	14 (10.00)
Immunization Status			
- Age-Specific Vaccination Complete	60 (85.71)	62 (88.57)	122 (87.14)
- Age-Specific Vaccination Missing	10 (14.29)	8 (11.43)	18 (12.86)
Reason for Missing Vaccination (n=18)	**N=10**	**N=8**	**N=18**
- Non-availability of vaccines	2 (20.00)	4 (50.00)	6 (33.34)
- Vaccination center too far	1 (10.00)	3 (37.50)	4 (22.22)
- Out of town	2 (20.00)	0 (0.00)	2 (11.11)
- Unaware of next doses	3 (30.00)	1 (12.50)	4 (22.22)
- Adverse reaction previously	2 (20.00)	0 (0.00)	2 (11.11)
Adverse Reactions After Vaccination			
- Yes	5 (7.14)	8 (11.43)	13 (9.29)
- No	65 (92.86)	62 (88.57)	127 (90.71)
Type of Adverse Reaction (n=13)	**N=5**	**N=8**	**N=13**
- Pain	2 (40.00)	3 (37.50)	5 (38.46)
- Swelling	1 (20.00)	2 (25.00)	3 (23.08)
- Fever	2 (40.00)	2 (25.00)	4 (30.77)
- Rash	0 (0.00)	0 (0.00)	0 (0.00)
- Inconsolable Cry	0 (0.00)	1 (12.50)	1 (7.69)
- Vomiting	0 (0.00)	0 (0.00)	0 (0.00)
- Diarrhea	0 (0.00)	0 (0.00)	0 (0.00)

Table 4: Out-of-Pocket Expenditures

Expenditure Type	Urban (Rs)	Rural (Rs)	p-value
Travel	350	220	0.01
Registration	150	100	0.02
Vaccines	500	350	0.03
Drugs/Medicine	200	150	0.04
Total OOP Expenditure	1200	820	0.01
Loss of Wages	300	200	0.02

Table 5: Out-of-Pocket Expenditures by Hospital Type in India

Expenditure Type	Government Hospital (Rs)	Private Hospital (Rs)	p-value
Travel	200	400	0.01
Registration	00	200	0.02
Vaccines	00	700	0.03
Drugs/Medicine	100	300	0.04
Total OOP Expenditure	350	1600	0.01
Avg. Loss of Wages	400	400	0.1

Table 6: Healthcare Access and Preferences

Characteristic	Urban (n=70)	Rural (n=70)	Total (n=140)
Distance to Vaccination Site			
- <1 km	25 (35.71)	30 (42.86)	55 (39.29)
- 1-3 km	20 (28.57)	25 (35.71)	45 (32.14)
- 3-5 km	15 (21.43)	10 (14.29)	25 (17.86)
- >5 km	10 (14.29)	5 (7.14)	15 (10.71)
Travel Time to Vaccination Site			
- <15 min	28 (40.00)	35 (50.00)	63 (45.00)
- 15-30 min	27 (38.57)	25 (35.71)	52 (37.14)
- >30 min	15 (21.43)	10 (14.29)	25 (17.86)
Waiting Time at Vaccination Site			
- <15 min	20 (28.57)	15 (21.43)	35 (25.00)
- 15-30 min	30 (42.86)	30 (42.86)	60 (42.86)
- 30-60 min	15 (21.43)	20 (28.57)	35 (25.00)
- >1 hr	5 (7.14)	5 (7.14)	10 (7.14)
Mode of Travel			
- Walking	15 (21.43)	25 (35.71)	40 (28.57)
- Public Transport	30 (42.86)	35 (50.00)	65 (46.43)
- Personal 2-wheeler	20 (28.57)	10 (14.29)	30 (21.43)
- Personal 4-wheeler	5 (7.14)	0 (0.00)	5 (3.57)
General Healthcare Facility			

- OPD: Government	40 (57.14)	50 (71.43)	90 (62.29)
- OPD: Private	25 (35.71)	15 (21.43)	40 (28.57)
- OPD: Mixed	5 (7.14)	5 (7.14)	10 (7.14)
- IPD: Government	45 (64.29)	55 (78.57)	100 (71.43)
- IPD: Private	20 (28.57)	10 (14.29)	30 (21.43)
- IPD: Mixed	5 (7.14)	5 (7.14)	10 (7.14)

DISCUSSION

The findings of this study highlight significant disparities in healthcare access, preferences, and out-of-pocket (OOP) expenditures between urban and rural populations in Maharashtra regarding immunization for children under five. These differences underscore the broader challenges faced by urban and rural communities in accessing essential health services.

The proximity to vaccination sites and travel times showed notable differences between urban and rural participants. Rural participants generally had closer access to vaccination sites, with 30 rural participants living within 1 km of the site compared to 25 urban participants. This finding aligns with previous research indicating that rural immunization programs often benefit from localized centers, which reduce travel burdens for rural families.[6]

However, urban participants faced longer travel distances and times, which likely contribute to higher OOP expenditures. A significant number of urban participants (15) traveled more than 30 minutes to reach vaccination sites, compared to 10 rural participants. This increased travel burden in urban areas can be attributed to urban sprawl and the concentration of healthcare facilities in certain urban zones, necessitating longer commutes for many families.[7]

The two groups ' waiting times at vaccination sites were similar, indicating that service efficiency might not differ significantly between urban and rural settings. However, the higher reliance on personal 2-wheelers among urban participants (20 compared to 10 in rural areas) suggests that urban families might face greater challenges in accessing public transport, potentially increasing their transportation costs.[8]

The study found that OOP expenditures were consistently higher for urban participants across various categories, including travel, registration, vaccines, drugs/medicine, and loss of wages. The total OOP expenditure for urban participants averaged Rs. 1200 compared to Rs. 820 for rural participants, a significant difference with a p-value of 0.01. This finding is supported by Mathur, et al. (2020), who reported that urban healthcare costs are often higher due to increased service fees, transportation costs, and indirect costs such as lost wages.[9]

The higher travel costs in urban areas (Rs. 350 compared to Rs. 220 in rural areas) and registration fees (Rs. 150 compared to Rs. 100) reflect the additional financial burden urban families face. Additionally, urban participants spent more on vaccines and medicines, likely due to a higher reliance on private healthcare providers, who charge more for these services.[10]

The loss of wages was also higher for urban participants (Rs. 300 compared to Rs. 200), which can be attributed to the longer travel and waiting times, as well as the higher opportunity cost of time in urban settings. This finding underscores the economic impact of immunization on urban families, who might be more dependent on daily wages and face higher opportunity costs.[11]

These findings suggest that while rural participants benefit from closer proximity to vaccination sites and potentially lower costs, urban participants face significant financial and logistical barriers. Policy interventions should focus on improving the accessibility and affordability of immunization services in urban areas. Strategies could include increasing the number of vaccination centers, enhancing public transportation options, and providing subsidies or financial assistance to offset OOP expenditures. Moreover, efforts should be made to streamline immunization processes to reduce waiting times and associated costs. Public-private partnerships could be explored to expand the reach of affordable immunization services in both urban and rural settings.[12]

CONCLUSION

In conclusion, this study highlights the critical need to address the disparities in healthcare access and out-of-pocket (OOP) expenditures for immunization between urban and rural populations. The findings indicate that private healthcare facilities impose a significantly higher financial burden on families, particularly in terms of travel, registration, vaccines, and medication costs. Given these disparities, there is an urgent need to promote immunization at government centers where vaccines are often provided at no cost. Ensuring the availability of high-quality vaccines at these centers is crucial to maintaining public trust and increasing immunization coverage, particularly in economically disadvantaged regions.

To further reduce OOP expenses, particularly those associated with traveling and loss of wages, several strategies could be implemented. Enhancing the accessibility of government vaccination centers by increasing their number, especially in densely populated urban areas, would reduce travel distances and associated costs. Additionally, implementing mobile vaccination units or organizing community-based vaccination camps in both urban and rural areas could help bring services closer to the

population, thus minimizing travel time and expenses.

By adopting these measures, policymakers can help ensure more equitable access to immunization services, reduce the financial strain on families, and ultimately improve public health outcomes across Maharashtra.

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