

ORIGINAL ARTICLE

A Cross-sectional study on Out-of-Pocket expenditure towards Immunization and its consequences faced by families with under-five Children Residing at one of the Cities of Western India

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ABSTRACT

Background: When immunization of under-five children results in Out-of-Pocket Expenditure (OOPE), it affects motivation of parents for vaccination inversely. **Objectives:** To assess determinants affecting preference for specific/mixed type of health facilities and to estimate out-of-pocket expenditure towards immunization of under-five children. To assess opinion of participants for prevention/decreasing OOPE towards immunization. **Methods:** A community-based cross-sectional study was conducted at one of zones of Ahmedabad city, selected by simple random sampling. Following technique of “30×7 cluster survey” with necessary house-hold information received from Municipal Corporation, selection of 7 children was pursued from each cluster reaching to sample-size of 210 (30 X 7). **Results:** Of 211 children included in study, 124(58.77%), 68(32.23%) and 19(9%) had taken immunization services from government, private and mixed variety respectively. Majority of families (110, 88.71%) preferring government healthcare-facility for immunization incurred expenses <5000 INR/child as while in other two groups, all beneficiaries had expensed>5000 INR/child. **Conclusions:** Determinants like child’s gender, parents’ education, Type of family, Socio-economic status, delivery place of child and occupation of father had statistically significant association with preferred place of vaccination. Fixation of upper ceiling-limit of vaccines which are recommended by pediatricians but not covered in government run program was one of suggestions.

KEYWORDS

Immunization, Out-of-pocket expenditure, Under-five children

INTRODUCTION

The term ‘out-of-pocket expenditure’ (OOPE) is defined as the expenses incurred at the point

of receiving health-care directly made by households.(1) Vaccination is known as most cost-effective and impactful health

intervention used across world and has resulted in rapid declines of many serious childhood infectious diseases from selected regions.(2) As per data of WHO, about 2–3 million deaths under 5 years of age could be preventable by introduction of immunization.(3)

As per recent estimates from National Family Health Survey-2019-21 (NFHS 5), 76.4 % children are fully immunized in India.[4]Previous studies indicate that individual variables which are responsible for vaccination, are gender, age, birth order, family size, number of children below age 3 years, household wealth, caste, and maternal education.(5–7)

India lags behind many less-developed neighbors in vaccination rates due to high growth-rate, geographical variations and some remote populations that are unable to be delivered for health-care facilities, lack of awareness, inadequate supervision, and lack of micro-planning and inter-sectoral coordination. (8)

Under five children are immunized at no cost by all public health-care facilities, but various unaddressed still significant indirect costs associated with immunization have an impact on compliance and contribute to vaccine reluctance. Expenditures towards conveyance to medical Centre, lost earnings, registration fees, and prescribed drugs for vaccine-related side effects also play a major role in expenditure.(9) Expenditure incurred on vaccination of child may hamper the overall need including nutrition of other children as well as elderly who are in need.

In this context, this study was attempted to estimate expenditure on Immunization with their determinants. Due to scarcity of data in Gujarat about out-of-pocket Expenditure faced by families of children under-five towards immunization, current research was conducted.

To estimate the amount out-of-pocket expenditure faced by families towards immunization of under five children. To assess various reasons and determinants for preference to particular place for vaccination given by parents/care-givers of under-five children. To assess the role of demographic

determinants in facing any consequences of Out-of-pocket expenditure and to receive suggestions/recommendations of families regarding vaccines not included in government run immunization Programme.

MATERIAL & METHODS

A Cross Sectional Study was conducted during November 2022 to January 2023 at Ahmedabad city which is one of the largest cities situated in Gujarat province of Western India. Families with Under five years' children were included. The ethical approval was obtained from Institutional ethics committee (GCSMC/EC/Project/APPROVE/2022/453).

Ahmedabad city is divided in seven administrative zones by Ahmedabad Municipal Corporation, of which one Zone was selected randomly, which turned out to be north zone. There are total 14 wards in north zone which were listed from that one ward was selected randomly by lottery method. List of 20,023 identified households was taken from the authorities of the Urban Health Centre of selected ward.

A standard technique of “30×7 cluster survey” suggested by World Health Organization in Module 7 of EPI (Expanded Programme on Immunization) coverage survey was followed.(10)Following cluster sampling technique in selected zone, total 30 clusters were made with necessary house-hold information received from Municipal Corporation. A cluster(sampling) interval (667 – a round figure) was obtained by dividing the total households by 30 (number of clusters). A random number (255) less than the cluster interval was generated with the help of a currency note. The cluster, which represented this number, i.e., 255 was taken as the first cluster and then 2nd cluster was (Random number 255 + sampling interval i.e., 667 = 922) selected; then subsequent clusters were selected by adding the cluster interval of 667 into cumulative frequency of previously selected unit. Already demarcated area as a part of administrative protocol by corporation was given due consideration and no changes were done to them considering one unit for cluster marking. Nearby societies and sub-area were merged to make one unit as the selected

ward was much large. Thus, 30 clusters were selected covering whole population of selected ward. From each cluster, selection of the starting household was done randomly and then continued to the next nearest household until a total of 7 children were selected who are fully immunized, age less than under-five, living in that area since more than one year (to rule out migrants/visitors) and whose guardian/parents are willing to participate in research after explaining the purpose in detail. Same methodology was adopted for all thirty clusters. The last visited household of 30th cluster had two eligible children and both were included in study which made data collection of 211 participants for current research.

Data collection was done with personal interview of parents/guardians of under-five child in pre-validated questionnaire which included various sociodemographic details along with determinants for OOPE on vaccination. Questionnaires regarding consequences faced by families included compromised variables on nutrition, education, clothing and medical or travel needs of other family-members. All these consequences were answered with pooled comment as yes or no being memory re-call-based information. The socioeconomic classification of families was pursued with modified B G Prasad classification (11) with CPI (Consumer Price Index) taken as released by Ministry of Labor and Employment for November 2022.(12) Question about suggestions/recommendations of beneficiaries (parents/guardians of under-five children to prevent or decrease OOPE towards immunization was open ended. Data entry and data analysis were pursued with standard software, i.e., Microsoft office Excel version 2019 and Statistical packages for social sciences (SPSS Version 26).

RESULTS

The study subjects were divided into three groups according to their preferred place of vaccination as follows: 1. Government (including state government/municipal corporation run health care facilities), 2. Private and 3. Mixed variety which included beneficiaries who had taken one or more

vaccines at different varieties of health facilities mentioned earlier. Total 211 children were included in the study, of them, 124(58.77%), 68(32.23%) and 19(9%) had taken immunization services from government, private and mixed variety respectively. Families with preference of government healthcare facility for immunization incurred expenses per child as follows: 35(28.22%), 49(39.52%) and 26(20.97%) respectively for <500, 500-2500 and 2500-5000 INR, while remaining 14 (11.29%) families had incurred >5000 INR. Other two groups which had preference for private healthcare facility and mixed preference, all beneficiaries (100%) had incurred >5000 INR per child. The maximum range of expenses for immunization with private healthcare preference was up to 18,000 INR in two participants while it was extended up to 10,000 INR in families with inclination for mixed preference.

Of total, 146 under-five children were males, more than 1/3rd participants (37.44%) were in 2-3 years age-group. Of total, majority i.e., 124 (58.76%) had taken immunization services from government run healthcare facilities. On assessing the role of educational status of father, of 68 under-five children who had taken immunization from private healthcare facilities, very few, i.e., 10 (14.70% in that group) were educated up to primary level or less than that while on contrary in group with preference to only government run healthcare facilities for immunization, out of total 124, 73 (58.87%) had education level of primary or illiterate. The role of education of father was found to have statistically significant association with preferred place for immunization with p value of <0.0001. Of total 124 children with preference for government run healthcare facilities, 112 (90.32%) were living with nuclear family, in context to socio-economic class of family, 44(35.48%) and 40 (58.82%) were included in upper socioeconomic class as per modified BG Prasad classification with preference for government and private healthcare facilities respectively. Of evaluated selective sociodemographic variables, determinants like gender of child, educational level of parents (both father and

mother), Type of family, Socio-economic status, place of delivery of child and occupation of father had statistical significance association with preferred place of vaccination. The Cramer's V statistics endorsed that education of father, Type of family, socio-

economic status and place of delivery with preferred place of vaccination had calculated Cramer's V value between 0.2 to 0.6 which suggested moderate association while remaining variables showed Cramer's V value \leq 0.2 which suggested mild association. (Table 1)

Table 1: Association between Socio-Demographic variables and preferred place of vaccination among study participants (n=211)

Variables		Preferred place of vaccination				Chi square value (P value)	Cramer's v
		Government (%) n=124	Private (%) n=68	Mixed (%) n=19	Total (%) n=211		
Gender	Male	94 (75.81)	42 (61.76)	10 (52.63)	146 (69.19)	6.749 (0.034)	0.179
	Female	30 (24.19)	26 (38.24)	9 (47.37)	65 (30.81)		
Age (completed years)	1-2	29 (23.39)	9 (13.24)	3 (15.79)	41 (19.43)	9.98 (0.125)	0.154
	2-3	47 (37.90)	23 (33.82)	9 (47.37)	79 (37.44)		
	3-4	22 (17.74)	23 (33.82)	2 (10.53)	47 (22.27)		
	4-5	26 (20.97)	13 (19.12)	5 (26.32)	44 (20.85)		
Education of Father	Illiterate	44 (35.48)	4 (5.88)	2 (10.53)	50 (23.70)	41.42 (<0.0001)	0.313
	Primary	29 (23.39)	6 (8.82)	4 (21.05)	39 (18.48)		
	High school	17 (13.71)	19 (27.94)	7 (36.84)	43 (20.38)		
	Diploma	18 (14.52)	19 (27.94)	4 (21.05)	41 (19.43)		
Education of Mother	Graduate & above	16 (12.90)	20 (29.42)	2 (10.53)	38 (18.01)	13.553 (0.035)	0.179
	Illiterate	33 (26.61)	16 (23.53)	7 (36.84)	56 (26.54)		
	Primary	45 (36.29)	25 (36.76)	6 (31.58)	76 (36.02)		
	High school	34 (27.42)	9 (13.24)	4 (21.05)	47 (22.27)		
Type of Family	Graduate & above	12 (9.68)	18 (26.47)	2 (10.53)	32 (15.17)	15.42 (<0.0001)	0.27
	Nuclear	112 (90.32)	46 (67.65)	15 (78.95)	173 (81.99)		
Socioeconomic status	Three generation	12 (9.68)	22 (32.35)	4 (21.05)	38 (18.01)	19.802 (0.011)	0.217
	Upper	44 (35.48)	40 (58.82)	12 (63.16)	96 (45.50)		
	Upper middle	38 (30.66)	20 (29.41)	3 (15.79)	61 (28.91)		
	Middle	10(8.06)	2(2.94)	1(5.26)	13(6.16)		
	Lower middle	16 (12.90)	6 (8.82)	1 (5.26)	23 (10.90)		
Birth order	Lower	16(12.90)	0(0)	2(10.53)	18(8.53)	2.65 (0.617)	0.079
	1	99 (79.84)	59 (86.76)	16 (84.21)	174 (82.46)		
	2	18 (14.51)	6 (8.82)	3 (15.79)	27 (12.80)		
Place of delivery	3	7(5.65)	3(4.41)	0(0)	10(4.74)	18.75 (<0.0001)	0.211
	Government	92 (74.19)	29 (42.65)	12 (63.16)	133 (63.03)		
Occupation of Father	Private	32 (25.81)	39 (57.35)	7 (36.84)	78 (36.97)	7.047 (0.029)	0.182
	Labourer	61 (49.19)	20 (29.41)	8 (42.11)	89 (42.18)		
Occupation of Mother	Professional	63 (50.51)	48 (70.59)	11 (57.89)	122 (57.82)	3.179(0.528)	0.087
	House wife	56 (45.16)	32 (47.06)	9 (47.37)	97 (45.97)		
	Labourer	50 (40.32)	21 (30.88)	8 (42.10)	79 (37.44)		
	Professional	18 (14.25)	15 (22.06)	2 (10.53)	35 (16.59)		

On evaluating the association between determinants of Out-of-pocket expenditure and preferred place of vaccination among study participants, determinants like number of accompanying persons with vaccinee during last visit (p-value 0.002), Distance of vaccination site from home(p-value 0.005), Travel Time to vaccination site from Home (p-value <0.0001) and Mode of Travel to vaccination site(p-value <0.0001) were found to have statistically significant association with OOPE while place of general healthcare for children (other than immunization needs) whether government or private did not show any statistical significant association with OOPE. Out of total 211, 19 participants with preference of mixed type of vaccination were excluded for data analysis of table 2 to prevent overlapping impacts of both government and private hospital on preferred place of

vaccination. For 87.90% of beneficiaries, only one person was used to accompany vaccinee during last visits in case of government health facilities as preferred place of vaccination while none of the beneficiaries had government vaccination site within 500 meters of their place of residence. For beneficiaries with private health care facility as preferred place of immunization, 51 (75%) had to make provision for 15-30 minutes of travel-time to reach vaccination center. In context to conveyance towards immunization site, more than three –fifth (77, 62.10%) of total with preference for government hospital were used to reach the site by walking while nearly three-fourth (51, 75%) of total with preference for private health-care facility were used to reach the site by personal vehicle; either two-wheeler or four-wheeler. (Table 2)

Table 2: Association between Healthcare facility variables and preferred place of vaccination among study participants (n=192)

Variables	Government (%) n=124	Private (%) n=68	Total (%) n=192	Chi Square (χ^2) Value (p value)	Cramer's v
Place of general Health care for children (other than immunization needs)					
OPD					
Government	44(35.48)	17 (25)	61(31.77)	2.227(0.135)	0.104
Private	80 (64.52)	51 (75)	131(68.23)		
IPD					
Government	71 (57.26)	30 (44.12)	101(52.60)	3.179 (0.081)	0.123
Private	53 (42.74)	38 (55.88)	91(47.40)		
Number of Accompanying persons with vaccinee during last visit					
1	109 (87.90)	48 (70.59)	157(81.77)	8.83 (0.002)	0.205
2	15 (12.10)	20 (29.41)	35(18.23)		
Distance of vaccination site from home					
<500m	0 (0)	5 (7.35)	5(2.60)	12.74 (0.005)	0.174
500m-1 km	104 (83.87)	48 (70.59)	152(79.17)		
1-5 km	16 (12.90)	9 (13.24)	25(13.02)		
>5km	4 (3.23)	6 (8.82)	10(5.21)		
Travel Time to vaccination site from Home					
<15 min	94 (75.81)	17 (25)	111(57.81)	46.48 (<0.0001)	0.469
15-30 min	30 (24.19)	51 (75)	81(42.19)		
Mode of Travel to vaccination site					
Walking	77 (62.10)	0 (0)	77(40.10)	98.88 (<0.0001)	0.484
Personal Two Wheelers	25 (20.16)	30 (44.12)	55(28.65)		
Public Transport	4 (3.23)	0 (0)	4(2.08)		
Personal Four Wheelers	0 (0)	21 (30.88)	21(10.94)		
Private Cabs	18 (14.51)	17 (25)	35(18.23)		

On evaluating the association between selected demographic determinants and facing any consequences of Out-of-pocket expenditure among study participants as described in methodology section; socioeconomic class of family and place of

vaccination revealed statistical significance. Other determinants like age of child, education of either parent, type of family and occupation of either parent did not reveal any statistical significance in their association with OOPE. (Table 3)

Table 3: Association between selected demographic determinants and facing any consequences of Out-of-pocket expenditure among study participants (n=211)

Determinants	Faced any consequences of Out-of-pocket expenditure		Chi Square Value (χ^2) (p value)
	Yes (%) n=36	No (%) n=175	
Age of child (in completed years)			
1-2	7 (19.44)	34 (19.43)	1.897 (0.594)
2-3	12 (33.33)	67 (38.29)	
3-4	11 (30.56)	36 (20.57)	
4-5	6 (16.67)	38 (21.71)	
Father's education			
Diploma	11 (30.56)	30 (17.14)	9.260 (0.055)
Graduate and above	10 (27.78)	28 (16)	
High school	7 (19.44)	36 (20.57)	
Illiterate	4 (11.11)	46 (26.29)	
Primary	4 (11.11)	35 (20)	
Mother's education			
Graduate and above	8 (22.22)	24 (13.71)	3.246 (0.355)
High school	6 (16.67)	41 (23.43)	
Illiterate	7 (19.44)	49 (28)	
Primary	15 (41.67)	61 (34.86)	
Type of family			
Nuclear	28 (77.78)	145 (82.86)	0.522 (0.467)
Three generation	8 (22.22)	30 (17.14)	
Socio-Economic Class (as per modified Prasad Classification) *			
Upper	5 (13.89)	76 (43.43)	18.288 (0.001)
Upper Middle	9 (25)	51 (29.13)	
Middle	6 (16.67)	12 (6.86)	
Lower Middle	6 (16.67)	18 (10.29)	
Lower	10 (27.77)	18 (10.29)	
Father's occupation			
Professional	26 (72.22)	96 (54.86)	3.692 (0.056)
Labour	10 (27.78)	79 (45.14)	
Mother's occupation			
House Wife	17 (47.22)	80 (45.71)	1.395 (0.498)
Labour	11 (30.56)	68 (38.86)	
Professional	8 (22.22)	27 (15.43)	
Place of Vaccination			
Government	2 (5.56)	122 (69.71)	56.305 (<0.0001)
Mixed	4 (11.11)	15 (8.58)	
Private	30 (83.33)	38 (21.71)	

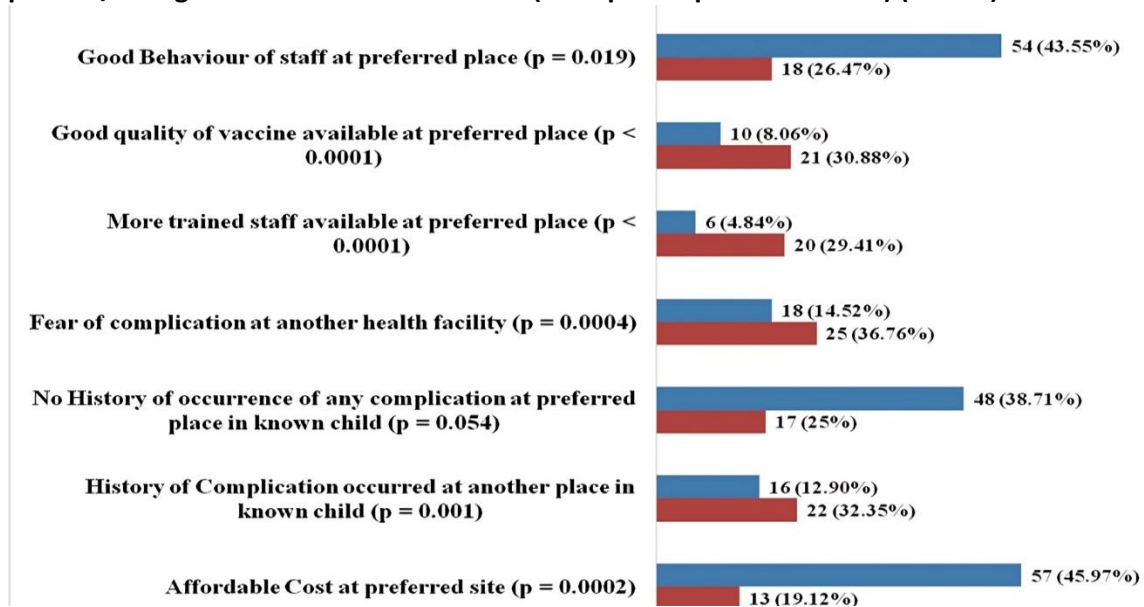
Distribution of various reasons for preference to particular place for vaccination given by parents/care-givers of under-five children are depicted in Figure 1. For beneficiaries with preference towards government health-care

facility, various important reasons were: affordable cost (57, 45.97%), Good Behavior of staff at preferred place (54, 43.55%), Referred by Family member, Friend, ASHA, Doctor (53, 42.74%) and No History of occurrence of any

complication at preferred place in known child (48, 38.71%). For beneficiaries with preference towards Private health-care facility, various important reasons were: Fear of complication at another health facility (25, 36.76%), History of Complication occurred at another place in known child (22, 32.35%), Good quality of vaccine available at preferred place (21, 30.88%) and more trained staff available at

preferred place (20, 29.41%). On further statistical analysis, the reason "No History of occurrence of any complication at preferred place in known child" did not revealed statistical significance while all other reasons were found to have statically significant (p value <0.05) association with place preference for vaccination.

Figure 1: Distribution of various reasons for preference to particular place for vaccination given by parents/care-givers of under-five children. (Multiple Responses allowed) (n= 192)



Various suggestions or recommendations by parents/guardians of beneficiaries to prevent/decrease OOPE towards immunization were asked as open-ended question which was replied by 164 participants. Various suggestions/recommendations were evaluated and near similar suggestions were merged to form one common consensus. The most common suggestion (108, 65.85%) was- All available vaccines shall be provided free of cost at all government run healthcare facilities. Families included in "below poverty line" standards pre-decided by governments shall receive immunization services at free/subsidized rate under some program/scheme was the second commonest suggestion (97, 59.14%). One of important suggestions revealed from parents was to fix upper ceiling-limit of vaccines which are recommended by pediatricians but not covered in government run Programme (72,

43.90%). Other suggestions were medicines or hospitalization cost for routine vaccination or adverse events following immunization shall be covered under PM-JAY (a national level health insurance plan offered to all citizen who fulfill certain criteria formulated by Central Government of India, majority population of country is covered under the same), the various brands of same vaccines shall be offered to beneficiaries at government run facilities to offer "cafeteria choice" approach; the price can be minimum or subsidized, particular application in smartphone/mobile should be made available for vaccines with cost under must, preferred(desirable) or additional category with price comparison of different companies. Other suggestions with similar meaning or non-relevance to prevent or decrease OOPE were excluded from final analysis. (Table 4)

Table 4: Various suggestions recommended by parents/guardians to prevent/decrease OOPE towards immunization (n= 164) *

Suggestions	Frequency (%)
All available vaccines shall be provided free of cost at government run healthcare facilities	108 (65.85%)
Families included in "below poverty line" standards pre-decided by governments shall receive immunization services at free/subsidized rate under some program/scheme	97 (59.14%)
Government should fix upper ceiling-limit of vaccines which are recommended by pediatricians but not covered in government run Programme.	72 (43.90%)
Insurance companies shall cover the cost towards immunization and after events	49 (29.87%)
Others#	121(73.78%)

*Multiple responses allowed

DISCUSSION

After extensive review of literature in all renowned databases, very few similar researches were found which analyses determinants of OOPE towards immunization.

In the research conducted by Mathur et al,(13) 72.36% were infants, and 56.10% had first birth order, mother accompanied nearly half of the vaccinee (49.6%) to the vaccination center and the most used mode of transportation was the personal vehicle (63%) while in the current study, the basic sampling units were fully immunized children, all participants were > 1 year of age and 82.46% had first birth order, in 81.77% participants, vaccinee were accompanied by one elder and most common mode of transportation (40.10%) was by walking. In the same study, it was also unveiled that mean duration of travelling to reach health facility was 11.87 (± 7.53) minutes while average OPPE was 0.74 (± 0.97) USD and statistically significant contributors to OOPE were age of vaccinee, religion, area of residence, birth order of vaccinee, longer waiting time, travelling time and long distances travelled to reach vaccination center. In present research, 57.81% vaccinee had to travel for < 15 minutes to reach vaccination center while for remaining it was more than 15 minutes while most of families preferring government set-up for immunization incurred expenses <5000 INR per child as compared to private set up, which was >5000 INR per child and the statistically significant factors among who faced any consequences of OOPE were socio-economic class of family and place of vaccination.

Srivastava et al (14) in their similar research reported that the mean expenditure incurred

on immunization varies from as low as Rs. 32.7 in Tripura to as high as Rs. 1008 in Delhi. In the same study, it was also unveiled that urban areas as place of residence, The children from Scheduled Castes had 12 % significantly lower likelihood of being immunized than children from Scheduled Tribe. Female children were 6 % significantly more likely to be fully immunized as compared to male children. Children from the rich wealth quintile were 14 % significantly more likely to be fully immunized than children from the poor wealth quintile. Children were 61 % significantly more likely to get immunized at a public facility in reference to a private facility.

Singh and Thakur (15) in their similar study conducted at one of the cities of northern India revealed that 44.93% were skilled-worker parents, 50.72% had education equal or higher than 10th grade and 57.97% had distance of selected vaccination site more than or equal to 5 kilometers, 55.07% were male child and the median of total OOPE towards immunization was found to be 35.5 INR.

The Cochrane database and U.S. National Library of Medicine by National Institute of Health (NIH) with other renowned database explicit no much literature on out-of-pocket expenditure towards vaccination in India or other developing countries. There is much literature available for vaccination coverage amount with reasons for same, policy level or program level evaluation or monitoring of on-going vaccination program of particular country but OOPE and especially recommendation by beneficiaries themselves are not being given significance in research part.

CONCLUSION & RECOMMENDATION

Majority of the study participants utilized Government facilities for vaccination though many also preferred private facilities. The higher out of pocket expenditure was found among families preferring private health care facilities over government.

Variables like Gender, parental education, family type, socioeconomic class, the location of delivery, the distance from home, travel time, and mode of transportation could have played major role in selecting the place of vaccination.

One of important suggestions from parents was to fix upper ceiling-limit of vaccines cost which are recommended by pediatricians but not covered in government run Programmes.

LIMITATION

The recall biases of study participants as under-five children were included and parents/guardian had to rely on memory of past occurrences. The individual consequences due to OPE on nutrition of other children or family members, clothing, medicines of other family members and many more possible detrimental consequences were not evaluated separately. Various suggestions/recommendations were evaluated through open ended questions and near similar suggestions were merged to common pool which might have created some error.

AUTHORS CONTRIBUTION

All authors have contributed equally.

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Nil

CONFLICT OF INTEREST

There are no conflicts of interest.

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