



Veracity of universal health coverage of maternal and neonatal health care among slum dwellers in a metropolitan city of India – Factors aiding access to and cost of availing these services to the poorest household

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1. Introduction

World Health Organisation considers maternal and child health (MCH) care as one of the most important component of assessing the health care delivery system of any nation.¹ Experts consider investing in MCH services has positive externalities for nations; meaning services would not only improve health of women and children but also impact health of other population groups in a positive way.^{2–4} In view of this countries have invested on improving their respective MCH services by focusing on quality of care, accessibility of mothers to Emergency Obstetric and Neonatal Care and establishing standards of Antenatal care, Intranatal care and Postpartum care.^{5–8}

Poor, especially women and children in urban slums are vulnerable, deprived and discriminated with respect to education, nutrition and health.^{9,10} Antenatal, intranatal, postnatal women and infants in slums are particularly in need of essential and specialised health care.¹¹ High cost of care can impose huge barrier for this vulnerable group to access health care¹² and push them further into poverty vicious cycle.¹³

Global Monitoring Report 2017 on tracking Universal Health Coverage (UHC) uses Reproductive, maternal, newborn and child health as one of the four categories of essential health services as tracer indicators for monitoring the level and equity in coverage in countries.¹⁴ In this context measuring accessibility to MCH care, as a component of Primary Health care and its economic impact on urban poor has a long term implication on improving UHC of reproductive and child health services.

This is particularly relevant in the Indian context where there is rapid urbanisation in major cities with exodus of people moving from rural to urban areas leading to number of slums propping up in all cities.¹⁵ India through National Health Mission and Reproductive and Child Health

Programme has invested huge resources in terms of finance and human work force, aimed at improving the health of women and children.¹⁶ However, what remains to be seen is if these investments improve accessibility to quality care for women and children while providing financial risk protection in alignment with the UHC framework.

Thus measuring accessibility and cost of availing MCH care services will inform health policy makers and programme managers if the system is pro poor. Further it would also help strategize improvement in MCH care service coverage to ensure UHC.

This study hence was undertaken in an urban slum setting which is considered to be the dwelling place of most under privileged and poor population with specific objective to measure accessibility, factors influencing choice of health facility and cost of availing maternal and neonatal health care (in terms of service user perspective) among the slum dwellers of Chennai Corporation.

2. Methodology

The study was conducted on mothers in Slums of Chennai Corporation (CoC). The CoC (previously Madras) is the Oldest Municipal Institution in India and capital city of Tamil Nadu, one of the progressive states in India.¹⁷ Chennai has a population of 4,646,372, with about 30% of the city's population (1.4 million) living in slums.

Cross sectional study design with cluster sampling was used for this study. Slums were selected using Probability Proportion Sampling (PPS) method from a zone wise (15 zones in CoC) list of slum population in Chennai Corporation. Sample size was 534, calculated assuming 50% access to universal antenatal care, relative precision of 12% of the prevalence, 5% significance level and multiplication factor of two for the cluster design effect. Required number of cluster logistically worked out

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was 50 with 11mothers per cluster, hence the total sample size was approximated to 550 (11*50). Assuming a birth rate of 15 per 1000 population in Chennai, slums with population less than 1500 were removed from the sampling frame. Fifty clusters from a total of 215 slums with population more than 1500 were selected. Totally 48 slums (4 clusters fell in two slums owing to the large population in the two slums) spread over 47 divisions was included in the study.

Mothers with at least one child delivered alive in the preceding one year and who were resident of Chennai were inclusion criteria while mothers who delivered outside Chennai were excluded. The details regarding access, factors influencing the choice and cost related to maternal and neonatal services availed were collected using a structured interview schedule using the local vernacular language Tamil.

Cost for in-patient service was measured for entire episode of hospitalisation. For outpatient services it was measured as a sum of all visits to a health facility. For conversion of Indian rupee to US dollar september 2019 rates were used.

3. Statistical analysis

Data was entered and analyzed using SPSS version 16. The descriptive statistics include proportions of mother accessing different health care facilities and reason for availing the service in the respective health facility, range, median and mean cost of availing the services. 'Chi' square, 't' tests and ANOVA were used respectively for proportion and means to test for statistical significance. Mann Whitney and Kruskal Wallis were used to compare median costs.

4. Ethical consideration

The study adhered to all ethical principles to protect the dignity, rights and welfare of participants. Informed consent in local language (Tamil) was obtained from all participants. Voluntary participation, freedom not to answer or withdraw at anytime and confidentiality of information was ensured. The proposal was reviewed and approved by the Institutional Ethics Committee of Sri Ramachandra University, Chennai.

5. Results

5.1. Background information

Totally 550 women were interviewed with mean age of 24.7 years (SD 3.6years). Mean age at marriage and first child birth were 21 (SD 2.9years) and 22 years (SD 3.1years) respectively. Twenty eight of the 550 women (5.1%) had married before the legal age of marriage which is 18 years in India while 33.1% (182/550) had their first child before the recommended age of child birth for India of 21 years. The mean age of recent child borne to the participant was 222.4 days (SD 95.6days) with 48% (262/550) male child and 52% (287/550) female child. Of 50 women who were employed prior to pregnancy and childbirth only 9 did not resign and received maternity leave; 4 received paid maternity leave, 3 with full pay and 1 half pay.

5.2. Access to maternal and neonatal health services (M&NHS)

Almost all women had at least ten antenatal visits (99.8%) with mean number of visits being 13.07 (SD 1.29). Two ultra sonograms were performed in 88.5% (489/550) of women with mean as 3 (SD 1.67). Seventy one (13%), 6 (1.1%) women and 12 (2.2%) neonates had at least one admission during their antenatal, postnatal and neonatal period respectively. Details regarding access to essential maternal and neonatal health services are given in Table 1.

Postnatal services were utilized by 34% (188/550) of women. The mean number of visits among women who availed the services was 1.03 (SD 0.204), while 91.1% (501/550) of neonate had at least one neonatal

Table 1
Access to antenatal, intranatal, postnatal and neonatal services.

Services	Number	%	Services	Number	%
Had two doses of Tetanus Toxoid injections	547	99.5	Delivery		
Iron and folic acid tablet consumed			Normal vaginal delivery	310	56.4
Less than 100	10	1.8	Assisted vaginal delivery	1	.2
100	86	15.6	Caesarean section	239	43.5
100–200	119	21.6	Immunization for child		
200	330	60.0	OPV (N = 550)	549	99.8
Did not consume	5	.9	BCG (N = 550)	548	99.6
Antenatal admission reason (N = 71)			Hepatitis B (N = 550)	518	94.2
Anaemia	18	25.4	Haemophilous influenza type B (N = 510)	497	97.4
Pain abdomen	12	16.9	DPT (N = 510)	497	97.4
PIH	7	9.9			
Oligomniuous	6	8.4			
Others	28	39.4			

visit (mean visit 1.1, SD 0.42)

5.3. Choices of health care facility for M&NHS

Women preferred to use both public and private facility for antenatal out-patient services (80%) and private for postnatal in-patient services (66.7%) and public facilities for other services (Table 2). Among women who used public and private facilities for their antenatal out-patient care 96% (95% CI: 94.28%–97.83%) availed USG services from private and used public health facility for all other services. The mean number of visits was 2.38 (SD 1.65) and 10.75 (SD 1.81) in private and public health facility respectively.

5.4. Factors influencing (aiding) the choice (access) of health facility for M&NHS

Major factor influencing choices of public health facility were free services and for claiming maternity cash benefit (Table 3). Perceived

Table 2
Choice of health facility.

Maternal and neonatal services	Choice of health facility N (%) (95% CI)		
	Public	Private	Combined
Confirmation of pregnancy	474 (86.2) (83.1–88.9)	76 (13.8) (11.1–16.9)	–
Antenatal out-patient	48 (8.7) (6.6–11.3)	62 (11.3) (8.8–14.1)	440 (80) (76.5–83.2)
Antenatal in-patient	55 (77.5) (66.7–86.1)	16 (22.5) (13.9–33.3)	–
Intranatal ^a	494 (89.8) (87.1–92.14)	55 (10) (7.7–12.72)	–
Postnatal out-patient	149 (79.3) (73.02–84.6)	39 (20.7) (15.4–26.98)	–
Postnatal in-patient	2 (33.3) (6.02–73.81)	4 (66.7) (26.19–93.98)	–
Neonatal out-patient	445 (88.8) (85.83–91.36)	53 (10.6) (8.12–13.51)	3 (0.6) (0.15–1.62)
Neonatal in-patient	7 (58.3) (30.21–82.83)	5 (41.7) (17.17–69.79)	–
Immunization	497 (90.4) (87.68–92.62)	49 (8.9) (6.74–11.51)	3 (0.5) (0.14–1.48)
All services	45(8.18) (6.1–10.7)	31 (5.64) (3.93–7.81)	474 (86.18) (83.1–88.88)

^a One delivery occurred at home.

Table 3
Factors influencing (aiding) the choice (access) of health facility^a.

Factors	Confirmation of pregnancy		Antenatal out-patient service		Antenatal in-patient service		Intranatal service		Postnatal out-patient service		Postnatal in-patient service		Neonatal out-patient service		Neonatal in-patient service	
	Pub	Pvt	Pub	Pvt	Pub	Pvt	Pub	Pvt	Pub	Pvt	Pub	Pvt	Pub	Pvt	Pub	Pvt
N	474	76	48	62	55	16	494	55	149	39	2	4	445	53	7	5
Services are free	458 (96.6)	6 (7.9)	46 (94.8)	1 (1.6)	53 (96.4)	-	474 (96)	1 (1.8)	145 (97.3)	-	2 (100)	-	433 (97.3)	6 (11.3)	7 (100)	-
N (%) (95% CI)	(94.7-98)	(3.3-15.77)	(86.9-99.3)	(0.8-7.7)	(88.5-99.4)	-	(93.9-97.4)	(0.09-8.6)	(93.6-99.1)	-	2 (100)	-	(95.5-98.5)	(4.7-22.1)	5 (71.4)	-
Claiming maternity cash benefit N (%) (95% CI)	456 (96.2)	-	45 (93.8)	-	43 (78.2)	-	474 (96)	-	112 (75.2)	-	2 (100)	-	351 (78.9)	-	5 (71.4)	-
Care is good	(94.1-97.7)	54 (71.1)	(83.9-98.3)	59 (95.2)	(65.9-87.6)	15 (93.5)	(93.9-97.4)	54 (98.2)	(67.7-81.6)	36 (92.3)	2 (50)	2 (50)	(74.9-82.3)	48 (90.6)	5 (100)	(33-94.9)
N (%) (95% CI)	(0.16-1.7)	(60.1-80.4)	(1.6-16.1)	(87.4-98.8)	(0.09-8.6)	(72.8-99.7)	(2.6-6.1)	(91.4 99.9)	(80.5-98)	(9.4-90.6)	(1.1-4)	(9.4-90.6)	(1.1-4)	(83.3-96.4)	-	-
Physical proximity N (%) (95% CI)	11 (2.3)	17 (21.4)	-	8 (12.9)	1 (1.8)	4 (25%)	5 (1)	3 (5.5)	1 (0.7)	10(25.6)	3 (75)	3 (75)	2 (0.4)	3 (5.7)	-	-
	(1.2-4)	(14.1-32.1)	-	(6.2-23)	(0.09-8.6)	(8.5-49.9)	(0.37-2.2)	(1.4-14.1)	(0.03-3.3)	(13.8-41)	(24.2-98.8)	(24.2-98.8)	(0.08-1.5)	(1.5-14.6)	-	-

^a Multiple response hence sum will not add up to 100%.

good care and physical proximity were the factors leading to use of private health facility. Among women who used combination of health facility, predominant reason for availing services at private health facility was referral by treating physician in public health facility for investigation especially USG (96.6%, 95% CI: 94.56%–98.01%).

5.5. Cost of availing M&NHS

Highest median cost was in neonatal in-patient service (30,000 INR, 426 USD, IQR; 4750/117,000 INR) followed by intranatal (30,000 INR, 426 USD, IQR; 17,000/63,000 INR) and antenatal out-patient (12,445 INR, 177 USD, IQR; 9350/19,850 INR) in private health facility. Least median cost was in neonatal out-patient and postnatal out-patient services (100 INR, 14 USD, IQR; 50/100 INR) in public health facility. Postnatal in-patient services (10,000 INR, 142 USD, IQR; 10,000/10,000 INR) had highest median cost in public health facilities followed by neonatal in-patient services (6000 INR, 85 USD, IQR; 3000/7000 INR).

Direct non-medical was highest compared to direct medical and indirect cost for accessing care among users of public health facility. Direct medical cost was highest in users of private or combination of health facilities.

Difference in cost of availing services from public, private and combination of both was statistically significant for total cost and total direct medical across all services (p value 0.000) except postnatal (p value 0.533) and neonatal inpatient services (p value 0.202). Indirect cost and direct non-medical cost did not show statistical significance across services. However, the difference was statistically significant (p value 0.000) for informal payment with a mean cost of Rs 1565.33 (USD 22), Rs 370.96 (USD 5) and Rs 1639.24 (USD 23) for public, private and combination of health facilities respectively.

Direct non-medical cost accounted for 61% (95% CI: 57%–65%) of total cost while direct medical and indirect cost accounted for 25% (95% CI: 21.4%–28.6%) and 14% (95% CI: 11.1%–17%) respectively. The informal payment accounted for 32% (95% CI: 28.1%–36%) of direct non-medical cost and 8% (95% CI: 5.7%–10.3%) of total cost of care. Direct non medical cost (64%) was major contributor to total cost for public health facility users, while direct medical cost was the major contributor for private (87%) and combination (52%) health facility users.

5.6. Burden (catastrophic health expenditure) of M&NHS cost on the household

Households with catastrophic Health Expenditure (CHE) using capacity to pay method were 30.7% of total households (95% CI: 26.98%–34.68%), while using the percent of household consumption 54.2% (95% CI: 50.03%–58.37%) of household fall into CHE (Table 4). Use of exclusive private health facility for care has the highest risk (OR 60.7 and 73.8) of CHE employing both methods of calculation.

6. Discussion

The study finding indicates that slums mostly constituted socially deprived group (schedule caste 61.8% and backward communities 37.5%) with high economic dependency among women (9% women employed, of whom 82% had to resign).

At Access to antenatal and intranatal services was satisfactory with 99.8% of pregnant women having at least ten antenatal visits, which is higher than WHO recommendation of eight¹⁸ and 99.8% of institutional delivery, 99.5% receiving 2 doses of tetanus toxoid injections and 97.3% consuming iron and folic acid tablets. Most women (88.5%) have undergone at least two ultra sonograms during their antenatal period.

Although pregnant women had access to antenatal and intranatal services, the postnatal service was low with only 34% access. This was probably because we only assessed women accessing postnatal services at institutions and didn't include house visits by health care workers as

Table 4
Burden of cost of care on household.

Facility used	Catastrophic expenditure as 40% of capacity to pay				Catastrophic expenditure as 10% of household consumption			
	Catastrophic expenditure N (%)	Acceptable expenditure N (%)	Odds Ratio (95% CI)	Total N (%)	Catastrophic expenditure N (%)	Acceptable expenditure N (%)	Odds Ratio (95% CI)	Total N (%)
			p value				p value	
Public health facility	6 (13.3%)	39 (86.7%)	1	45 (100.0%)	13 (28.9%)	32 (71.1%)	1	45 (100.0%)
Private health facility	28 (90.3%)	3 (9.7%)	60.7 (14–263) <0.0001	31 (100.0%)	30 (96.8%)	1 (3.2%)	73.8 (9.1–599.5) 0.0001	31 (100.0%)
Public and private health facility	135 (28.5%)	339 (71.5%)	2.6 (1.1–6.3) 0.0346	474 (100.0%)	255 (53.8%)	219 (46.2%)	2.9 (1.5–5.6) 0.0021	474 (100.0%)
Total	169 (30.7%)	381 (69.3%)		550 (100.0%)	298 (54.2%)	252 (45.8%)		550 (100.0%)

we could not obtain documentary evidence for such visits. The immunization coverage of the children was also satisfactory with 99.8% OPV, 99.6% BCG, 94.2% hepatitis-B, 97.4% haemophilus influenza type B and DPT vaccination.

Most users accessed public health facility for all services, even among users of combination of facilities, mean visits to public facilities were more than private (2.4 vs. 10.8 visits) indicating preference to public health facilities for care related to pregnancy and its outcome. Similar results are reported in a study done in Mumbai slums.^{19,20} However, for neonatal in-patient services users preferred private over public health facilities, this could be due to perceived seriousness with regards to neonatal complications and hence accessed private facility for immediate and good care, nevertheless it is difficult to conclude with small numbers needing neonatal (12) in patient care. It was further compelling to note that users of combination of health facilities, majority (96%) availed ultra sonogram services from private facilities. Informal discussions with the Medical Officers at public health facilities revealed that ultra sonogram machines available at the urban health centers were not technologically advanced enough to detect birth defects accurately during antenatal screening, hence referred women to nearby private facilities or public tertiary level health facilities.

Overwhelming reason for choosing public health facilities for M&NHS were free services and the provision of maternity cash benefit. Under the Dr. Muthulakshmi Reddy scheme, the Government of Tamil Nadu provides INR 12000/- (recently increased to INR 18000/-) cash incentive for mothers belonging to the poor households who avail antenatal, intranatal and immunization services from the public health facilities. The cash is paid in three installments; at registration before 12 weeks of antenatal period, during the institutional delivery and at completion of third dose of DPT for infant, thus ensuring early antenatal registration, safe institutional delivery and improved immunization coverage. This finding puts in a counter argument to the philosophy of user fee, which is recommended by other studies^{21,22} in providing maternal and child health care at the public health facilities. The data clearly indicate that poor households utilize the public health facilities more than the private health facilities because of free services, similar findings are reported in a study done in Kenya.²³ The data further supports the ideology of cash benefit schemes for improving the utilization of antenatal, intranatal and immunization services among the poor households.

Cost of availing M&NHS, which is estimation of out of pocket expenditure by household showed that total median cost was 11 times higher among users of private health facilities and 2 times more among users of combination of facilities as compared to users of public health facilities, which is similar to a study in Pakistan.²⁴ Although services were free users reported incurring direct medical expenditures indicating a form of payment against services, this was reported to be due to non-availability or shortage of certain consumables like drugs, gloves etc.,

Direct medical cost contributed most (61%) to total cost, similar to findings reported in World Health Report.²⁵ However, maximum contribution to total cost among users of public facilities was direct non-medical cost while in private facilities and combination of facilities it was direct medical cost. Although women using a combination of facilities accessed more services from the public facilities, highest contributions came from direct medical cost because services in private facilities are exorbitantly high.

Informal payment was one of the major contributors to cost; comparable results were reported in a multicentre study.²⁶ Although direct non-medical cost was not significantly different, informal payment which is a part of direct non-medical cost was significantly different for the public, private and combination of facilities. Informal payment being highest in combination of facilities, followed by public facilities and least in private facilities. Informal payment in public health facilities was 4 times higher than private facilities indicating burden of corruption borne by the poor households while accessing public facilities for essential M&NHS.

The burden of these cost structures is highlighted in the framework of CHE. More than half of the households (54.2%) fell into CHE using Household Consumption Expenditure (HCE) method, while 31% of households had CHE using Capacity To Pay (CTP) method, this finding was similar to a study done in India.²⁷ The households utilizing exclusive private facilities were at higher risk of CHE (OR 60.7 using CTP, 73.8 using HCE), followed by households using combination of facilities (OR 2.6 using CTP, 2.9 using HCE) verify that pushing of poor households into accessing private facilities increases the risk of CHE.

Strength of the study is its design, which has a representative sample of mothers dwelling in CoC slums. This is probably first of its kind study done in the Chennai City's slum. The study was able to measure the access and factors influencing the choice of health facilities for various M&NHS and its associated cost among poor households. The study also highlights the burden of informal payments particularly in the public health facilities, further drawing attention to the importance of public and private health facilities in providing universal access to M&NHS.

Prime limitation of the study is recall bias as the data was collected retrospectively in some instances more than a year. This couldn't be avoided because there was not enough number of mothers who had delivered within the last 6 months per slum cluster. The other limitation of the study was that we couldn't cross verify the actual household consumption expenditure. Similarly the expenditure on accessing health care was also based on the reported figures, although cross verification was done whenever records were available. The maternal and intranatal cost estimates could be an underestimate as we included only women with live births.

7. Conclusion

The study reported the CHE as the major deterrent in universal

access to M&NHS for women of slums in Chennai. Free services and maternity cash benefit schemes are main reasons for access to various services, directly indicating that poor households are dependent on public health facilities for M&NHS. However, there is a huge gap in financial risk protection for accessing M&NHS as households are pushed into buying services from private facilities due to inadequacy of public facilities. This push to private facility has shown to increase the cost of availing M&NHS many folds consequently augmenting risk of CHE by household many times. Accessing M&NHS from public facilities doesn't necessarily cushion households from financial risk. Informal payments substantially add to the OOP expenditure and risk of CHE among poor households.

Finding recommends that administrators of public health facilities should not only focus on free services but also improve quality of care. There is a need for paradigm shift from provider to patient centred care by provision of quality equipments, its maintenance and change in attitude towards patient care. There is a strong need to look into the informal payment system which is the major contributor to CHE.

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Declaration of competing interest

None.

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