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Title of research: Impact Evaluation of Community Clinic Intervention on Maternal Healthcare Utilization in the Slums of Delhi

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Underutilization of healthcare remains a concern among the poor in both rural and urban areas in India. Even with better infrastructure in urban areas compared to the rural areas, according to the NFHS-5 report, more than 30 percent of urban area women do not complete the required number of antenatal care visits (a minimum of four visits, as per WHO). Only 34 percent of urban area women consume iron tablets (for 180 days) during pregnancy. The data reveals that just 3.8 percent of infants delivered at home are taken to a healthcare facility within 24 hours of birth (NFHS-5). Poorer sections of society are even more vulnerable in terms of maternal and child healthcare utilization. *Aam Aadmi Mohalla Clinic* (AAMCs) or Community Clinic is a primary care intervention to make healthcare accessible and affordable by reducing distance to the health facility, waiting time and cost of treatment. This intervention can play a key role in reforming urban health service delivery, addressing health inequities, and strengthening primary healthcare in Delhi. These clinics are based on the idea of the 'Zero Cost Model' for patients, implying that they aim to provide free consultation, free medicines, and free diagnostics or tests. Such a healthcare model can play a significant role in improving maternal and child health in the slum areas. One of the main objective of AAMC is to provide preventive services such as antenatal and postnatal care, free of cost. There is no impact evaluation study on AAMC as previous studies are mostly concerned with number of beneficiary or types of services at the clinic. AAMC benefits related to maternal health care has not been given much attention in previous studies. This study attempts to fill the gap in literature by conducting

impact evaluation of AAMC on maternal healthcare utilization by using Propensity Score Matching (PSM) methodology. AAMC is expected to have its impact on maternal health care utilization through following process of change.

Input	Activities	Output	Expected outcomes	Expected final outcome
AAMC set up by government in slum cluster	Free health check-up, tests, consultation and medicine	Women accessing free primary medical facility during pregnancy	More number of check-ups and tests done during pregnancy and post birth.	Improved antenatal care and postnatal care (improved maternal-child health)

In this study, impact evaluation methodology is used to estimate AAMC intervention impact on antenatal care, postnatal care and specific components of maternal care such as receiving iron tablets, blood test, and dietary advice. A primary survey of pregnant women is conducted in slum areas of Delhi. Data is collected at the household level in eight different slum clusters. Random sampling approach is followed. Survey is conducted in areas with and without AAMC to construct treatment and control groups. Conditions of inclusion, exclusion, recall period, intervention period and other parameters are specified to minimize any bias in the survey. The two sets (treatment and control) of data are used to match the AAMC participants with a comparison group of non-participants based on information that helps predict participation, such as socio-economic characteristics and other household level factors. Participant is matched with a nonparticipant using the entire socio-economic dimension, for whom the predictor values are identical. Three different Propensity Score Matching models are used; nearest neighbour matching, kernel matching, and radius matching models. The propensity score is calculated for each observation in the participant and the comparison-group samples using standard logit models. Logistic regression of treatment T (Participation in AAMC) on observed predictors X is as follows,

$$\text{Logit}\ (T_i^{MC} = 1 \mid \text{X}) = \beta_0 + \beta_1 x_{1i} + \beta_2 x_{2i} + \ldots\ldots + \beta_k x_{ki} + \varepsilon$$

T_i^{MC} = 1 is being a participant in AAMC. $x_{1i}, x_{2i}, \ldots\ldots\ldots x_{ki}$, are different socio economic, and other household level or individual level variables.

Matching is carried out using the estimated probability of using AAMC for individuals in treatment and control group. Using the propensity score, matched-pairs are constructed on the basis of how close the scores are across the two samples. Taking average of the impact across all the individuals in the population, is used to estimate of the mean impact of the AAMC presence, termed as the Average Treatment Effect (ATE):

$$ATE_{MC} = E(\delta) = E(Y_1 - Y_0),$$

where E(.) represents the average. Y_1 and Y_0 are maternal health care utilization indicators with and without intervention. To know the average impact of the treatment only on those who receive the treatment, ATE on the Treated (ATT) is calculated.

$$ATT_{MC} = E(Y_1|T=1) - E(Y_0|T=1)$$

For average impact of the treatment only on those who did not participate in AAMC, the ATE on the Untreated (ATU) is calculated,

$$ATU_{MC} = E(Y_1|T=0) - E(Y_0|T=0).$$

Maternal care utilization is the main outcome variable. Seven outcome variables are considered in this study for evaluating the impact on maternal care use; Completed ANC (minimum four visits), Blood pressure check done, Blood test done, Iron tablets received, Diet advice, Postnatal checkup of child, and Postnatal checkup of woman.

After using a common support and matched propensity value, the treatment effect is estimated in three matching models; nearest neighbour, radius and kernel matching. Results show that the estimated ATT is quite close in all three matching models. The estimated ATT is significant and negative for complete ANC at 1% significance level with Nearest Neighbour (-0.110), Radius (-0.172) and Kernel (-0.174) matching methods. Results show highest negative impact with Kernel matching method. However results also show a strong positive impact on postnatal care utilization for both women and children. AAMC impact on postnatal checkup for children is positive (0.211, 0.232, 0.235) and significant in all three matching methods, at 1% level of significance. Similarly, the estimated impact on postnatal checkup for women is also positive (0.093, 0.107, 0.106) and significant in all three matching models. AAMC is a nearby facility which can be accessed conveniently for basic medical assistance/check-ups after birth, thereby showing a strong significant impact on postnatal care in all matching methods. The impact on

postnatal checkup is higher for children compared to women, which may be due to the negligence of women health at household level among the poor. Negligence of women health among poor household is also reported in many previous research studies.

In different matching models in this study, specific ANC components such as blood pressure check, blood test, dietary advise, and receiving iron supplement also show negative impact of AAMC, however results remains insignificant. This negative impact is associated with lack of systematic and planned antenatal care provisions in AAMCs. As also observed in the field survey these clinics do not ensure availability of all needed ANC check-ups within the clinic. For example clinics are providing iron tablets or blood pressure checks but they are not in a position to provide immunization or ultrasound at the clinic. Referral system even if available (at empanelled laboratories), may discourage users as they have to visit different places for medical checkup and medical tests which has both direct (transportation) as well as indirect cost (opportunity cost). Visting multiple places for the antenatal health care service may discourage women from completing required number of antenatal care visits. Most importantly, as observed in the field visit that AAMCs are not providing ANC cards which keep record of progress/status of checkups done, thereby further contributing to negative impact. On the other hand in control groups where there is no AAMC available, pregnant women even if registered their pregnancy at a distant health facility, choose a facility where they can have the complete set of checkups along with ANC card. Even of the health facility is not nearby, ANC card helps keeping record on the progress of checkups done and encouraging for follow-ups. If AAMCs can ensure similar provisions it can have much stronger positive impact on ANC utilization, given that it is available nearby.

Robustness test and balancing checks are also performed to validate PSM analysis results. The common support condition is imposed to adjust for observable differences between treated group and control group. Different balancing measures are calculated for conditioning variables before and after matching, to ensure that the estimated propensity score balances well in the matched treated and non-treated groups. First, the balancing of covariates is checked through a two-sample t-test. The balancing test significance level is specified at 0.01, to select only those observations that are significant at 1%. This significance level applies to the test of each single variable of the vector of control variables of respondent characteristics. Rubin's 'R', the ratio of treated to (matched) non-treated variances is also checked, satisfying the condition. A sharp reduction in the Pseudo R-square indicates a high quality of the match. Likelihood ratio test of the joint significance is insignificant suggesting that matching quality

is good. Finally, visual analysis of the density distribution of the propensity score is checked to ensure sufficient overlap between treated and control group observations. Rosenbaum sensitivity test verifies that there is no selection bias.

Overall, users positively endorse this intervention in primary health care which contributed to a decline in out-of-pocket expenditure on medicines and tests. However, implementation of structured prenatal and postnatal care programs/packages is required that can provide regular check-ups, screenings, and counselling to mothers before and after birth. These programs should also focus on nutrition education and family planning.