Title: Unlocking Equality in Maternal and Child Health- the Power of Providers, Place and Time in India

Authors

1.Arpana Kullu*, PhD Scholar, School of Health Systems Studies, Tata Institute of Social Sciences, Mumbai, India, email Id: arpanakullu@gmail.com

2..Priyanka Dixit, Assistant Professor, Centre Chairperson Centre for Health and Social Science, School of Health Systems Studies, Tata Institute of Social Sciences, Mumbai, India, email Id: dixit15bhu@gmail.com or priyanka.dixit@tiss.ac.in

* Corresponding author: School of Health Systems Studies, Tata Institute of Social Sciences, Mumbai, India, email Id: arpanakullu@gmail.com

Abstract

Socio-economic inequalities exacerbate the adverse impacts on health. This study examines the role community based strategy closer to communities in addressing socio-economic and caste-based disparities in maternal and child healthcare (MCH) services in India. Methodology- We explore the role of three key elements: providers (CHWs), place (close to home or facility-based care), and time (timing of contact with provider during pregnancy) on the reduction of gap in MCH service utilisation between marginalised and non-marginalised communities. The study uses data from last two rounds of the National Family Health Survey (NFHS), covering the periods 20015-2021 and analyses continuum of care completion for pregnancy care. Findings reveal that the presence of CHWs significantly increased (from 22.7% in NFHS-4 to 31.0% NFHS-5) MCH service utilization and thus ensuring completion of CoC, especially among marginalized communities, thus narrowing disparities in healthcare access. When assisted by CHWs, CoC completion increased from 20.5% to 29.5%, for rural women; 15.6% to 25.3% for poor women and 27.1% to 39.8% for ST women. This study emphasizes the need for strengthening community-based interventions closer to community and optimally leveraging role of CHWs in reducing health inequities for achieving universal MCH coverage in India.

Introduction

Health Disparity and health equities are essential tenets in the context rights based approach to public health. Health disparities are not simply differences in health among groups but specifically refer to worse health outcomes among socially disadvantaged groups, particularly those experiencing racial/ethnic or economic disparities (Braveman, 2014). Additionally health equity is the principle of striving for the highest possible standard of health for all people, prioritizing the needs of those most at risk due to social conditions (Braveman, 2014). The link between social disadvantage and health disparities is well-established through extensive research, demonstrating the impact of economic and social factors on health outcomes (Adler & Stewart, 2010; Krieger, 2001; Winslow, 1948). Inequities in socio-economic status significantly impact individual health and well-being. Research consistently links negative health outcomes for both mothers and children to disparities in healthcare accessibility during pregnancy and childbirth. In the Indian context the impact of socio-economic status has also indicated disparity and inequity in health status and utilization of health services. Limited healthcare usage arises from a variety of factors, including demand-related issues such as poverty, lack of education, rural residency, and broader socio-economic challenges. On the supply side, factors include insufficient availability, accessibility, and disparities in healthcare resources (Balarajan et al., 2011). Similarly, evidence in case maternal and reproductive service utilisation is negatively impacted by social identity, education levels, gender and economic status (Sanneving et al., 2013) (Saxena et al., 2013) (Say & Raine, 2007) (Salam & Siddiqui, 2006). These barriers are exacerbated for marginalized communities, amplifying health inequities even more. Addressing the issues of health disparity and inequitable access for marginalized communities is critical in achieving the goals of Universal Health Coverage (UHC) and Sustainable Development Goals (SDG).

The continuum of care is a vital framework for programs aiming to enhance maternal, newborn, and child health outcomes. It encompasses two key dimensions: continuity across the life stages—adolescence, pregnancy, childbirth, the postnatal period, and childhood—and integration across different levels of care, from households to health facilities (Iqbal et al., 2017). This perspective emphasizes the intergenerational benefits for both mothers and children that can be realized by implementing interventions during early stages such as adolescence and the antepartum period. The existing literature on the continuum of care for maternal health services has increasingly focused on identifying demographic factors that

influence women's engagement throughout the maternity continuum. While these studies vary slightly in the components they include—such as family planning, antenatal care (ANC) visits (ranging from one to four), skilled birth attendance (SBA), facility-based deliveries, and postnatal care (PNC) at various intervals (24 hours, 48 hours, 2 weeks, and 6 weeks)—certain recurring patterns have been identified. Women with higher levels of wealth, education, and autonomy are consistently found to access a greater range of health services. However, challenges persist, with fewer than 25% of women in three South Asian countries and only 15% in six sub-Saharan African countries receiving all recommended components of care (Gandhi et al., 2022; McCarthy & Maine, 1992). These studies underline the need for further research and targeted interventions to enhance retention and coverage across the maternity continuum especially disadvantaged communities. Evidence from low resource settings hav also highlighted the importance of health information provided during ante-natal period and ensuring ante-natal services are essential for ensuring utilisation and continuity to maternal and child health services by addressing risk and complications (Birmeta et al., 2013) (Tenaw et al., 2022). Thus, reiterating the importance of ante-natal period.

Further, community centred approaches provide for opportunity to promote equity in healthcare access and outcomes. A recent systematic review pointed that the Community health workers (CHWs) may have the ability to significantly reduce disparities in maternal and new-born mortality among socioeconomic groups based on wealth, occupation, education, class, caste, tribe, or religion (Blanchard et al., 2019). Several studies have been analysed to understand that CHWs have impact on coverage of population, health behaviours, access to cash transfer schemes and health outcomes. These impacts have mostly studied in LMIC contexts through small scale population studies and for maternal and child health services. Blanchard and colleagues' (2019) systematic analysis also found that cash transfers had uneven equity in coverage and impacts on behaviours for women from lower socioeconomic backgrounds in South Asia, while evidence on mortality consequences was not sufficient. Further, community based approaches such as home visits by trained personnel, midwifery support, mobile health services, and culturally tailored maternal health programs have also proven effective in enhancing access, building trust, and improving maternal and newborn health outcomes, particularly for marginalized groups (Perry et al., 2015; Aidoo, 2024).

In India currently, there are three cadres of CHWs who are engaged to undertake the primary healthcare role. The all-female CHW cadres in India includes Auxiliary Nurse Midwives

(ANM), Anganwadi Workers (AWW) and Accredited Social Health Activists (ASHAs)primarily working for maternal and child health services (MCH). The ASHAs being the most recent addition compared to the two and are about more than 1 million across the country working since the inception of National Rural Health Mission in 2005. (National Health Mission, n.d.). With regards to CHW effectiveness, equity has been studied, as to whether and how CHWs reach and improve health in different marginalized groups compared to more advantaged groups in limited geographical locations with small samples (Seth et al., 2017). CHW characteristics including their familiarity of the local context due to proximity of location to beneficiaries, ability to build relationships in the village, and degree of similarity in socioeconomic characteristics helps them to deliver messages based of the individuals context. An analysis using NFHS-4, to understand the role of frontline workers in antenatal care visits (ANC) (4 or > 4 times), institutional delivery, full-immunisation of children, postnatal care (PNC) (within 2 days of delivery), and child survival concluded that maternal engagement with CHW was a positive predictor especially for the poor households (Rammohan et al., 2021). Another study that was carried out to understand the influence of ASHAs on maternal and child health services used India Human Development Survey (IHDS) and concluded that women from socio-economically disadvantaged backgrounds show a higher probability of improvement in service utilisation and health outcomes (Agarwal et al., 2019).

Besides these cross- sectional studies, a trend analysis using national-level data has not been undertaken to see the influence of service providers, place of ANC and time of ANC in improving continuum of care through an equity lense. Additionally, there is a need for generating more evidence on health program and intervention side factors to address inequality in MCH services (Yuan et al., 2014) Thus, this study focuses on assessing the role of Providers (which includes three cadres of community health workers, Place (which includes near home in community and away from home), and Time (timing of the first contact during pregnancy) in altering socioeconomic and caste-based disparities in the utilization of maternal and child healthcare services in India from 2015 to 2019. The chosen time period is significant as ASHAs have been involved since 2005, providing a good starting point to assess their influence across ante-natal, intra-natal, and post-natal periods on both community-based and institution-based activities over the years. Further, this study contributes to build evidence on understanding of equity impact through maternal engagement.

Methodology

Data Source and Sampling

This study utilizes data from the last three rounds of India's National Family Health Survey (NFHS), a nationally representative dataset of Indian households. The three rounds correspond to the periods 2005-06 for NFHS-3, 2015-16 for NFHS-4, and 2019-21 for NFHS-5. The survey employs a multi-stage cluster sampling technique. The details of number of households and women interviewed across the three rounds is given at Table 1. The data on Maternal and Child Health (MCH) care, outcomes, and women's engagement with health workers were extracted from the Women's Questionnaire, administered to women aged 15–49 years. Focusing on MCH care and outcomes, we included only those women who gave at least one birth within five years preceding the survey.

Table A. Details of Sample Population used in the Current Chapter

DETAILS	NFHS-4 (2015-16)	NFHS-5 (2019-21)
Total Households Interviewed	601,509	636,699
Total Number Of Women Interviewed, Age (15-49 Yrs)	699,686	724,115
Women Giving At Least One Birth (5 Years Preceding The Survey)	259,627	232,920
Total Number Of Most Recent Birth	190,898	176,843

The Women's Questionnaire provides comprehensive details on birth histories and information on all children born in the last five years. Information on utilization of services for ante- natal Care and post natal care has been only recorded for last birth, thus the sample size for the study is considered only for the most recent birth. For these mothers, the survey offers in-depth data about where, when and with whom the women interacted during the different phased of their pregnancy.

Variables

Outcome Variables

For understanding the association of service provider, place and timing of ANC and continuity of pregnancy, childbirth and post-partum care a new composite variable for Continuum of Care for Maternal Health (CoC) was constructed as given in Figure 2 below. For the constructing the composite index CoC, four or more ANC visits and 2 Tetanus Toxoid Injections were considered, institutional delivery in health facility either public or private for intra natal and post-natal visit within 48 hours was used. The Composite Outcome Variable was categorized as whether all the services were received across all the three phases or not as completed CoC or Not Completed CoC.
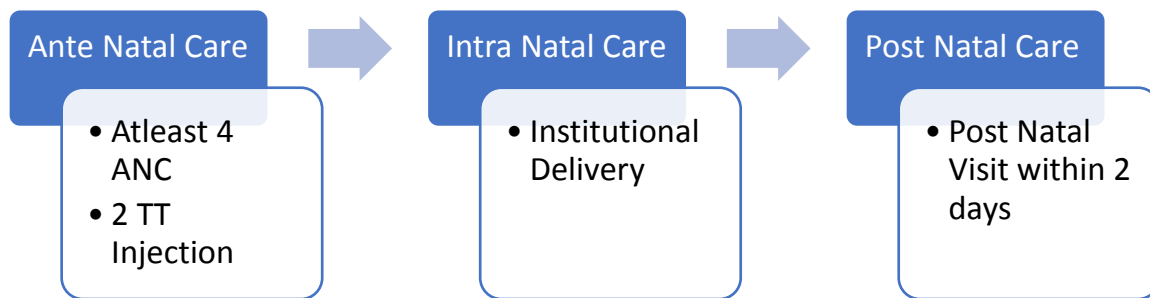
Ante Natal Care
- Atleast 4 ANC
- 2 TT Injection

Intra Natal Care
- Institutional Delivery

Post Natal Care
- Post Natal Visit within 2 days

Figure 2: Continuum of Care- Maternal Health (CoC)

Explanatory variables-

Ante-natal period is considered crucial stage in birth-preparedness and complication readiness (BPCR). BPCR is known to have positive impact on maternal and neonatal mortality (Soubeiga et al., 2014). Thus based on the available literature the explanatory variables are defined

i. Service Providers assisted during ante- natal care. This includes doctors, community health workers, unskilled workers like dais, traditional birth attendants etc. All the three cadres of CHW in India which are; Accredited Social Health Activist (ASHA), Anganwadi Workers (AWW) and Auxiliary Nurse Midwives (ANM) are included. They are all tasked with providing outreach and primary care to communities and they receive competency based training for the assigned job roles (Acharya, 2018).

ii. Proximity to place of ante-natal care- This variable is categorised as: away from home which includes both public and private facilities from primary health centres and above,

the second category is close to home which includes community settings like respondents home, outreach sessions, anganwadi etc. and the third category includes those who reported not receiving any ante-natal care.

iii.   Timing of ante-natal care- This includes early contact which is within 1st trimester, late contact which is after 1st trimester and lastly those who reported not receiving any ante-natal care.

Socio- Demographic Variable

For the current study, health inequality has been analysed according to the three main socio-economic indicators that have been used in the national level survey. The three social-economic indicators include proxy for economic status measured across poor and non-poor households based on assets (poor and poorer wealth quintiles grouped as poor and middle, richer and richest categorised as non-poor), second is the place of residence that is whether rural or urban and third is across caste based social group which includes Scheduled Caste, Scheduled Tribes and Non- SC/ST households. The wealth index, which categorizes households into five quintiles based on asset ownership and access to essential amenities, is a widely accepted proxy for income in large-scale surveys where reliable income data is often lacking . Its use as a stratified is particularly relevant for examining health inequities, as wealth differentials have been consistently associated with variations in health outcomes and service utilization (Dey et al., 2018; Pathak & Singh, 2011). The next stratifier, place of residence distinguishes where an individual is physically located. This distinction of location provides a context about availability and accessibility of health infrastructure along is support structures like transportation and health seeking behaviours. Previous studies have pointed out that rural households often face access and availability barriers especially in the context of MCH services as compared to their urban peers (Balarajan et al., 2011; Jana & Harata, 2016, Muniswamy et al., 2021). In addition the rural urban divide is also closely linked to poor access to resources which further has been documented to the widening in wealth gaps (Roy et al., 2013).

In Indian context caste is an important construct which forms the basis of social stratification and a crucial pre-requisite to measure inequality along with place of residence and wealth (Prasad et al., 2021; Singh et al., 2023). Further, studies by Borooah (2010) and Deshpande (2017) have documented adverse health outcomes due to caste- based exclusion thus, necessitating caste as an important stratifier for any equity-focused analysis.

In the context of understanding CHW engagement, stratifying by wealth, caste and place of residence provides for a clearer understanding of how equitably reaching poorer, rural and socially vulnerable SC & ST households—those who typically face greater barriers to accessing healthcare—is facilitated and to what extent helps in reducing disparities in maternal and child health services. Additionally, the chosen socio-economic indicators adequately capture health disparity and thus suitable for health equity assessment in Indian context (Nayar et al., 2007; Choudhury et al., 2023)

Data Analysis

To examine service provider engagement, importance of place and timing of ANC from an equity perspective across the last two rounds of the National Family Health Survey (NFHS), two sets of data analysis techniques were applied using STATA software version 15.

Firstly, we conducted a comparative analysis women who reported CoC completion were analysed across service providers, place of ANC and timing of ANC. Relative changes in outcome variables across various socio-economic categories between the two rounds corresponding between 2015-16 to 2019- 2021 were calculated. This approach allowed to capture and quantify the variations in maternal engagement across different socio demographic categories in the study. By comparing CoC completion across socio-economic categories, study aims to assess the influence of providers, place and timing of ANC in reaching marginalized and vulnerable communities, who are the primary targets of their interventions. The comparative analysis enables to identify trends between 2015-19, highlighting areas where progress has been made and where disparities persist.

Secondly, bivariate and multivariable analysis was done to examine the association of service providers, proximity of place of ANC to home and timing of ANC with completion of CoC. The multivariate analysis considered the effect of CHW engagement, close to community and ANC initiated within 1st trimester of pregnancy for pooled dataset. Interaction was also analysed of the exposure variables across time period of the last two rounds of NFHS.

Results

Overall Trends of womens engagement during ante-natal period with service providers, proximity of place and timing of ANC - There is also an increasing trend noted for engagement with skilled providers (Graph 1); engagement with doctors increased from about 59% to 62% and for CHWs the increase was from 24% to about 31%. There was an increase also noted for increase in close to home engagement during ANC (from 35% in 2015-16 to

46% in 2019-21), Graph 2. Lastly looking at timing of ANC, there was an increase from about 61% in 2015-16 to about 77% in 2019-21 (Graph 3), in women who accessed ANC within 1st trimester. Looking across the socio- economic categories there was notable preference for doctors, ANC care at away from home (PHC, CHC and Higher facilities) and accessing ANC within 1st trimester. However, the engagement with CHWs has predominately increased across women especially for women from rural (from 28.43% to 35.33%), poor (32.02% to 41.27%) and SC (from 27.13% to 34.47%) and ST (31.65% to 36.98%) over the last two rounds of NFHS. There is an overall increase in the CoC completion rate from 33.64 in NFHS- 4 to 43.16% in NFHS-5, (from Table 4). This indicates a positive trend in the completion of the full Continuum of Care across India between the two survey periods.

Completion of CoC across service providers, proximity of place of ANC and timing of ANC

Completion of CoC and Service providers- was highest among women assisted by doctors, increasing from 47.7% in NFHS-4 to 53.6% in NFHS-5, thus accounting for the preferred providers. CoC completion among women assisted by CHWs rose from 22.7% (NFHS-4) to 31.0% (NFHS-5) , indicates growing reliance on CHWs, especially in underserved settings. And women who were not assisted did not report completion of CoC across the last two rounds of NFHS.

Completion of CoC and Proximity of Place of ANC Women accessing ANC away from home, likely at formal health facilities, reported higher CoC completion compared to those receiving care closer to the community. ANC services closer to the community increasingly contributed to CoC completion, rising from 38.7% in NFHS-4 to 45.4% in NFHS-5. Further, ANC conducted away from home remained significant but only noted modest rise as compared to close to community (from 41.4% to 46.5%). This finding was indicative of improvements in both outreach services and facility-based care accessibility.

CoC Completion and Timing of ANC Initiation and Early initiation of ANC within the first trimester showed marked increase in CoC completion. Women accessing ANC **within 1st trimester** reported CoC completion improvement from 44.5% (NFHS-4) to 49.1% (NFHS-5). And for those who accessed ANC **After 1st trimester** reported moderate increase in CoC completion(28.9% to 31.9%).

The multivariable regression analysis revealed that CHW assistance, ANC services provided close to home, and early initiation of ANC within the first trimester were significantly associated with higher odds of CoC completion. Women who accessed ANC close to their

home had 18% higher odds of completing the CoC (OR = 1.18, 95% CI: 1.15–1.22), while those initiating ANC within the first trimester had 4% higher odds of completing the CoC (OR = 1.04, 95% CI: 1.01–1.09). These interaction odds were derived from pooled NFHS-4 and NFHS-5 data, reflecting changes over time.

Comparative analysis across marginalised and non-marginalised women

The analysis revealed significant improvements in the completion of the CoC across all socio-economic categories between NFHS-4 and NFHS-5, with variations in the magnitude of progress. In rural areas, CoC completion increased notably from 28.6% to 39.2%, driven by improvements in both the reach of health services and the growing role of Community Health Workers (CHWs), whose contribution to CoC completion among rural women rose from 20.5% to 29.5%. Urban areas continued to demonstrate higher CoC completion rates, improving from 45.6% to 53.3%, with a dominant contribution from doctor-assisted ANC, though CHW involvement also saw modest gains. Economic disparities remained evident but narrowed over time; among poor households, CoC completion increased substantially from 19.3% to 31.3%, reflecting a 62% relative improvement, with CHWs playing a pivotal role— CoC completion among CHW-assisted poor women rose from 15.6% to 25.3%. In contrast, non-poor households experienced a more modest improvement, from 45.1% to 52.4%, largely supported by higher engagement with formal healthcare providers. Similar trends were observed across social groups. Scheduled Castes (SC) showed improvement in CoC completion from 31.3% to 40.2%, with CHW-assisted care increasing from 21.9% to 28.9% and a growing reliance on ANC services closer to home. Among Scheduled Tribes (ST), CoC completion increased from 27.1% to 39.8%, marking the highest relative improvement, with CHWs contributing significantly to this gain. Non-SC/ST groups also demonstrated progress, with CoC completion increasing from 31.9% to 43.2%, driven by both enhanced outreach and formal service provision. These findings underscore the expanding role of CHWs and the importance of strengthening community-based services to address persistent socio-economic disparities in maternal healthcare. With regards to proximity of place, relative change in CoC completion (Table 5a, 5b, 5c) was important to note for women from rural (23.4%), poor (37.3%) and ST (41.9%) women indicating a convenient availability of services for these marginalised communities. The most prominent increase in CoC completion, in relation to the timing of ANC, was observed among women from poor households and ST women who accessed ANC after the first trimester. Among poor women, CoC completion increased from 16.8% in NFHS-4 to 22.0% in NFHS-5 (Table 6b), while for ST women, it rose from 22.7%

to 28.3% (Table 6c). Although both groups also showed improvements when ANC was initiated within the first trimester, the gains were relatively more modest in comparison.

Discussion

The findings underscore the increasingly critical role of Community Health Workers (CHWs) in extending the reach of maternal health services, particularly among rural, poor, Scheduled Caste (SC), and Scheduled Tribe (ST) populations. A recent systematic review looked at the effectiveness of CHW interventions in reaching out disadvantage groups in LMIC contexts and also enquired whether CHW programs contribute in reducing health service utilization inequities in the population (Ahmed et al., 2022). Evidence globally and locally have pointed out that while CHWs have been successful in increasing coverage to many disadvantaged communities (Ahmed et al., 2022) (Blanchard et al., 2019). Studies within Indian context have also reiterated the role of one of the cadres of CHWs, that is the ASHA. Studies have suggested that the contact with ASHAs is significantly associated in improvement in the uptake of ANC services and institutional delivery; especially for women from poor and low literate households (Roy et al., 2013) (Saxena et al., 2013). The ability to influence health service utilisation behaviours has also been ascribed to the fact that the gender of the CHWs and thus creates a comfortable space for women to share and the CHWs to deliver messages on issues sensitive to pregnancy and childbirth (Panday et al., 2017) (Ved et al., 2019). Further the selection of CHWs from the community makes them equipped is striking a close knit relationship. (Ved & Scott, 2020) In addition the guidelines also provides for provision for preference to ASHAs from marginalised community (GoI, 2014.) , could possibly also provides for a better understanding and help deliver messages acceptable to the community. Thus the findings of our study further emphasises strengthening the role of CHWs aligned with existing evidence for improving MCH care globally and in India to reduce health disparities and inequities. However, efforts of reducing health inequity only remains incomplete if the structural inequities persists in the community. Thus the reduction of these structural differences within the community require greater effort which expands beyond CHW. (Ahmed et al., 2022, Blanchard et al., 2019).

Completion of the Continuum of Care (CoC) was significantly higher among women who received antenatal care (ANC) from skilled providers, accessed services closer to their community, and initiated ANC within the first trimester. These results reaffirm the importance of community-based strategies and the proximity of services in facilitating CoC, especially for socio-economically disadvantaged groups. However, despite notable improvements over time,

persistent inequities remain, with marginalized groups still facing barriers to timely and adequate care. Strengthening the capacity of CHWs, expanding early ANC coverage, and addressing accessibility challenges are critical to closing these gaps and ensuring that improvements in maternal healthcare are equitably distributed.

References

1. Adler, N. E., & Stewart, J. (2010). Preface to *The Biology of Disadvantage: Socioeconomic Status and Health*. *Annals of the New York Academy of Sciences*, *1186*(1), 1–4. https://doi.org/10.1111/j.1749-6632.2009.05385.x

2. Agarwal, S., Curtis, S. L., Angeles, G., Speizer, I. S., Singh, K., & Thomas, J. C. (2019). The impact of India's accredited social health activist (ASHA) program on the utilization of maternity services: A nationally representative longitudinal modelling study. *Human Resources for Health*, *17*(1), 68. https://doi.org/10.1186/s12960-019-0402-4

3. Ahmed, S., Chase, L. E., Wagnild, J., Akhter, N., Sturridge, S., Clarke, A., Chowdhary, P., Mukami, D., Kasim, A., & Hampshire, K. (2022). Community health workers and health equity in low- and middle-income countries: Systematic review and recommendations for policy and practice. *International Journal for Equity in Health*, *21*(1), 49. https://doi.org/10.1186/s12939-021-01615-y

4. Aidoo, E. M. (2024). Community based healthcare interventions and their role in reducing maternal and infant mortality among minorities. *International Journal of Research Publication and Reviews*, *5*(8), 4620-36.

5. Balarajan, Y., Selvaraj, S., & Subramanian, S. (2011). Health care and equity in India. *The Lancet*, *377*(9764), 505–515. https://doi.org/10.1016/S0140-6736(10)61894-6

6. Birmeta, K., Dibaba, Y., & Woldeyohannes, D. (2013). Determinants of maternal health care utilization in Holeta town, central Ethiopia. *BMC Health Services Research*, *13*(1), 256. https://doi.org/10.1186/1472-6963-13-256

7. Blanchard, A. K., Prost, A., & Houweling, T. A. J. (2019). Effects of community health worker interventions on socioeconomic inequities in maternal and newborn health in low-income and middle-income countries: A mixed-methods systematic review. *BMJ Global Health*, *4*(3), e001308. https://doi.org/10.1136/bmjgh-2018-001308

8. Braveman, P. (2014). What are Health Disparities and Health Equity? We Need to Be Clear. *Public Health Reports*, *129*(1_suppl2), 5–8. https://doi.org/10.1177/00333549141291S203

9. Choudhury, P. K., Joshi, R., & Kumar, A. (2023). Regional and socioeconomic inequalities in access to pre-primary education in India: Evidence from a recent household survey. *International Journal of Child Care and Education Policy*, *17*(1), 13. https://doi.org/10.1186/s40723-023-00117-4

10. Dey, A., Hay, K., Afroz, B., Chandurkar, D., Singh, K., Dehingia, N., Raj, A., & Silverman, J. G. (2018). Understanding intersections of social determinants of maternal healthcare utilization in Uttar Pradesh, India. *PLOS ONE*, *13*(10), e0204810. https://doi.org/10.1371/journal.pone.0204810

11. Gandhi, S., Gandhi, S., Dash, U., & Suresh Babu, M. (2022). Predictors of the utilisation of continuum of maternal health care services in India. *BMC Health Services Research*, *22*(1), 602. https://doi.org/10.1186/s12913-022-07876-9

12. Iqbal, S., Maqsood, S., Zakar, R., Zakar, M. Z., & Fischer, F. (2017). Continuum of care in maternal, newborn and child health in Pakistan: Analysis of trends and determinants from 2006 to 2012. *BMC Health Services Research*, *17*(1), 189. https://doi.org/10.1186/s12913-017-2111-9

13. Jana, A., & Harata, N. (2016). Provisioning health care infrastructure in communities: Empirical evidences from West Bengal, India. *Socio-Economic Planning Sciences*, *54*, 37–46. https://doi.org/10.1016/j.seps.2016.02.003

14. Krieger, N. (2001). The ostrich, the albatross, and public health: An ecosocial perspective--or why an explicit focus on health consequences of discrimination and deprivation is vital for good science and public health practice. *Public Health Reports (Washington, D.C.: 1974)*, *116*(5), 419–423. https://doi.org/10.1093/phr/116.5.419

15. McCarthy, J., & Maine, D. (1992). A Framework for Analyzing the Determinants of Maternal Mortality. *Studies in Family Planning*, *23*(1), 23. https://doi.org/10.2307/1966825

16. Olaniran, A., Smith, H., Unkels, R., Bar-Zeev, S., & van den Broek, N. (2017). Who is a community health worker? - A systematic review of definitions. *GLOBAL HEALTH ACTION*, *10*. https://doi.org/10.1080/16549716.2017.1272223 WE - Science Citation Index Expanded (SCI-EXPANDED) WE - Social Science Citation Index (SSCI)

17. Panday, S., Bissell, P., van Teijlingen, E., & Simkhada, P. (2017). The contribution of female community health volunteers (FCHVs) to maternity care in Nepal: A qualitative study. *BMC Health Services Research*, *17*(1), 623. https://doi.org/10.1186/s12913-017-2567-7

18. Pathak, P. K., & Singh, A. (2011). Trends in malnutrition among children in India: Growing inequalities across different economic groups. *Social Science & Medicine (1982)*, *73*(4), 576–585. https://doi.org/10.1016/j.socscimed.2011.06.024

19. Perry, M., Becerra, F., Kavanagh, J., Serre, A., Vargas, E., & Becerril, V. (2015). Community-based interventions for improving maternal health and for reducing maternal health inequalities in high-income countries: a systematic map of research. Globalization and Health, 10(1), 63. https://doi.org/10.1186/s12992-014-0063-y

20. Prasad, J. B., Pezhhan, A., & Patil, S. H. (2021). Effect of wealth, social inequality, Mother's BMI, and education level on child malnutrition in India. *Diabetes & Metabolic Syndrome: Clinical Research & Reviews*, *15*(6), 102304. https://doi.org/10.1016/j.dsx.2021.102304

21. Rammohan, A., Goli, S., Saroj, S. K., & Jaleel, C. P. A. (2021). Does engagement with frontline health workers improve maternal and child healthcare utilisation and outcomes in India? *Human Resources for Health*, *19*(1), 45. https://doi.org/10.1186/s12960-021-00592-1

22. Roy, M. P., Mohan, U., Singh, S. K., Singh, V. K., & Srivastava, A. K. (2013). Determinants of utilization of antenatal care services in rural lucknow, India. *Journal of Family Medicine and Primary Care*, *2*(1), 55–59. https://doi.org/10.4103/2249-4863.109946

23. Sanneving, L., Trygg, N., Saxena, D., Mavalankar, D., & Thomsen, S. (2013). Inequity in India: The case of maternal and reproductive health. *Global Health Action*, *6*, 19145. https://doi.org/10.3402/gha.v6i0.19145

24. Saxena, D., Vangani, R., Mavalankar, DileepV., & Thomsen, S. (2013). Inequity in maternal health care service utilization in Gujarat: Analyses of district-level health survey data. *Global Health Action*, *6*(1), 19652. https://doi.org/10.3402/gha.v6i0.19652

25. Say, L., & Raine, R. (2007). A systematic review of inequalities in the use of maternal health care in developing countries: Examining the scale of the problem and the importance of context. *Bulletin of the World Health Organization*, *85*(10), 812–819. https://doi.org/10.2471/BLT.06.035659

26. Seth, A., Tomar, S., Singh, K., Chandurkar, D., Chakraverty, A., Dey, A., Das, A. K., Hay, K., Saggurti, N., Boyce, S., Raj, A., & Silverman, J. G. (2017). Differential effects of community health worker visits across social and economic groups in Uttar Pradesh,

India: A link between social inequities and health disparities. *International Journal for Equity in Health*, *16*(1), 46. https://doi.org/10.1186/s12939-017-0538-6

27. Singh, D. P., Chanda, S., Dwivedi, L. K., Dixit, P., & Jana, S. (2023). Importance of Caste-Based Headcounts: An Analysis of Caste-Specific Demographics Transition in India. *CASTE: A Global Journal on Social Exclusion*, *4*(1), 75–91.

28. Soubeiga, D., Gauvin, L., Hatem, M. A., & Johri, M. (2014). Birth Preparedness and Complication Readiness (BPCR) interventions to reduce maternal and neonatal mortality in developing countries: Systematic review and meta-analysis. *BMC Pregnancy and Childbirth*, *14*(1), 129. https://doi.org/10.1186/1471-2393-14-129

29. Tenaw, S. G., Tsega, D., Zewudie, B. T., Chekole, B., Eniyew, M. A., & Mesfin, Y. (2022). Completion of the maternal continuum of care and its association with antenatal care attendance during previous pregnancy among women in rural areas of the Gurage Zone, Southwest Ethiopia: A community-based cross-sectional study. *BMJ Open*, *12*(11), e066536. https://doi.org/10.1136/bmjopen-2022-066536

30. Ved, R., & Scott, K. (2020). Counseling Is a Relationship Not Just a Skill: Re-conceptualizing Health Behavior Change Communication by India's Accredited Social Health Activists. *Global Health: Science and Practice*, *8*(3), 332–334. https://doi.org/10.9745/GHSP-D-20-00426

31. Ved, R., Scott, K., Gupta, G., Ummer, O., Singh, S., Srivastava, A., & George, A. S. (2019). How are gender inequalities facing India's one million ASHAs being addressed? Policy origins and adaptations for the world's largest all-female community health worker programme. *Human Resources for Health*, *17*(1), 3. https://doi.org/10.1186/s12960-018-0338-0

32. Winslow, C. E. A. (1948). Poverty and disease. *American Journal of Public Health and the Nation's Health*, *38*(1 Pt 2), 173–184. https://doi.org/10.2105/ajph.38.1_pt_2.173

33. Yuan, B., Målqvist, M., Trygg, N., Qian, X., Ng, N., & Thomsen, S. (2014). What interventions are effective on reducing inequalities in maternal and child health in low- and middle-income settings? A systematic review. *BMC Public Health*, *14*(1), 634. https://doi.org/10.1186/1471-2458-14-634

Graph 1. Percentage Distribution of Service Providers Assisting women during Ante- Natal Care during NFHS- 4 & NFHS- 5

Table 1. Percentage Distribution of Service Providers Assisting women during Ante- Natal Care during NFHS- 4 & NFHS- 5, according to socio-economic categories

Socio- Economic Categories	NFHS- 4				NFHS- 5			
	Doctors	CHW	Unskilled	No One	Doctors	CHW	Unskilled	No One
Urban	76.12	14.30	0.36	9.22	76.03	19.32	0.37	4.27
Rural	51.57	28.43	0.49	19.51	57.35	35.33	0.47	6.85
Poor	40.54	32.02	0.68	26.75	48.66	41.27	0.46	9.45
Non-Poor	73.57	17.97	0.27	8.19	73.58	22.67	0.3	3.53
SC	54.60	27.13	0.42	17.68	58.24	34.47	0.56	6.72
ST	48.00	31.65	0.71	17.68	55.15	36.98	0.57	7.29
Non-SC/ST	57.18	24.68	0.46	19.63	62.51	31.07	0.37	6.05

Graph 2. Percentage Distribution of Proximity of Place, where Ante-Natal Care was initiated during NFHS- 4 & NFHS- 5

Percentage Distribution of Proximity of Place of Ante-Natal Care was initiated during NFHS- 4 & 5

- NFHS- 4 (2015-16)
- NFHS- 5 (2019-21)
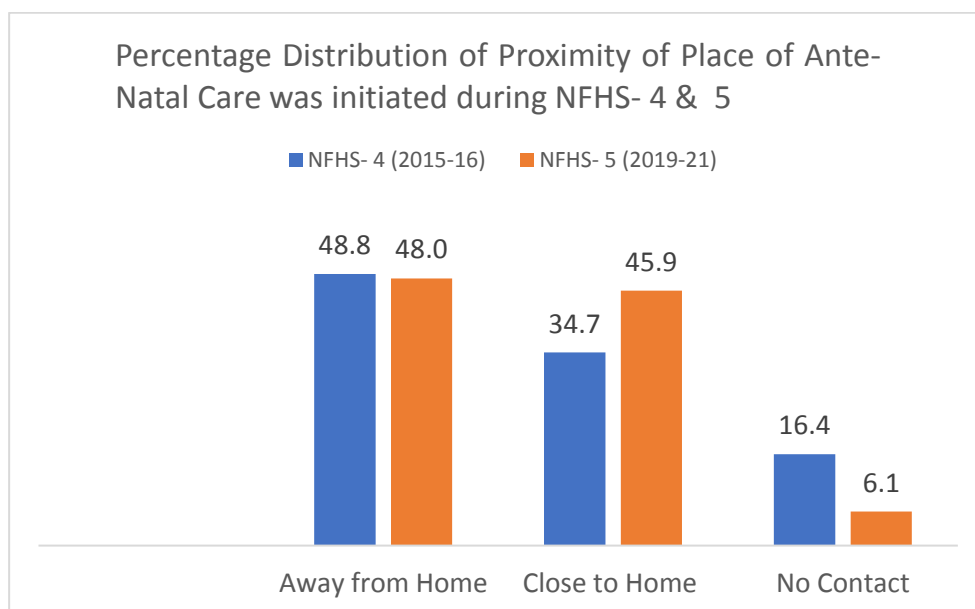
Table 2. Percentage Distribution of Proximity of Place, where Ante-Natal Care was initiated during NFHS- 4 & NFHS- 5, according to socio-economic categories

Socio-Economic Categories	NFHS- 4			NFHS- 5		
	Away from Home	Close to Home	No Contact	Away from Home	Close to Home	No Contact
Urban	63.38	27.40	9.22	60.42	35.31	4.27
Rural	42.67	37.83	19.5	43.16	49.99	6.85
Poor	34.41	38.86	26.73	37.72	52.82	9.45
Non-Poor	60.39	31.42	8.18	56.06	40.41	3.53
SC	45.60	36.56	17.84	45.75	47.53	6.72
ST	38.56	41.83	19.61	41.31	51.39	7.29
Non-SC/ST	50.62	31.71	17.67	50.47	43.48	6.05

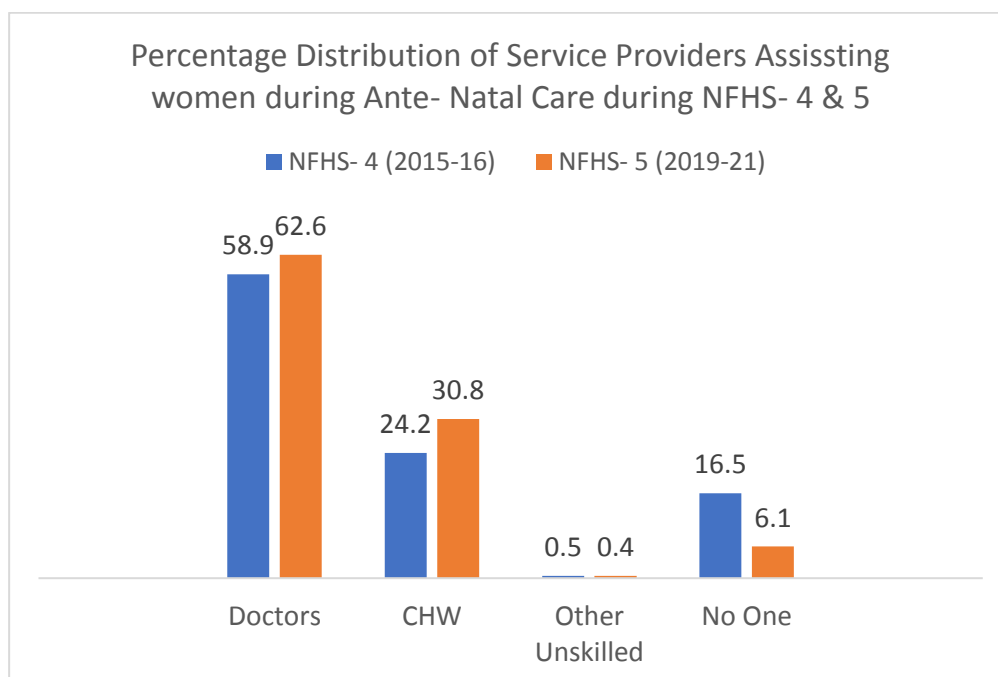Graph 3. Percentage Distribution of Initiation of Ante- Natal Care during NFHS- 4 & NFHS- 5
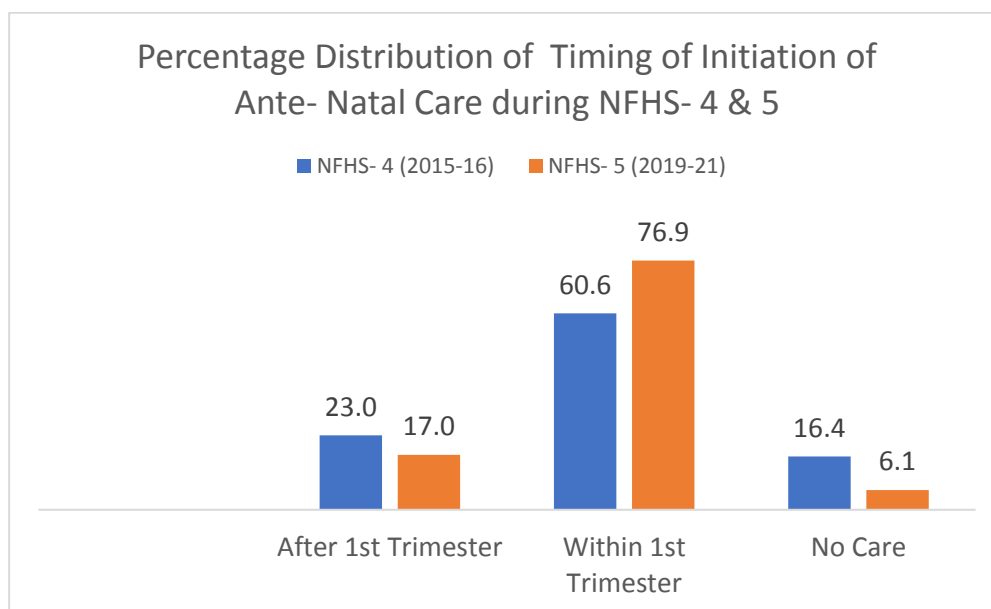
Table 3. Percentage Distribution of Time of Initiation of Ante- Natal Care during NFHS- 4 & NFHS- 5, according to socio-economic categories

Socio-Economic Categories	NFHS- 4			NFHS- 5		
	After 1st Trimester	Within 1st Trimester	No Care	After 1st Trimester	Within 1st Trimester	No Care
Urban	23.25	67.53	9.22	16.43	79.3	4.27
Rural	22.82	57.68	19.50	17.18	75.97	6.85
Poor	24.42	48.85	26.73	19.66	70.89	9.45
Non-Poor	21.77	70.05	8.18	14.87	81.60	3.53
SC	22.87	59.28	17.84	17.17	76.11	6.72
ST	21.7	58.69	19.61	15.36	77.35	7.29
Non-SC/ST	23.00	59.33	17.67	17.9	76.05	6.05

Table 4. Frequency Distribution of women reporting completion of CoC, according to Service Providers Assisting during ANC in NFHS- 4 & NFHS- 5

Service Providers assisting in ANC	NFHS- 4			NFHS- 5		
	Frequency	%	Total	Yes	%	Total
Doctors	53609	47.73	112309	59,326	53.57	1,10,735
CHW	10471	22.65	46230	16,872	30.96	54,498
Other Unskilled	98	11.41	861	132	16.9	782
No One	0	0	31498	0	0	10,828
Total	64179	**33.64**	190898	76,330	**43.16**	1,76,843

Table 4a. Frequency Distribution of women reporting completion of CoC, according to Service Providers Assisting during ANC in NFHS- 4 & NFHS- 5, across Rural and Urban Households

Service Providers	Place of Residence	NFHS- 4			NFHS- 5			Rate of Change between NFHS 4 & 5
		Frequency	%	Total	Frequency	%	Total	
Doctor	Rural	32,452	44.01	73,733	39,878	50.07	79,638	13.77
	Urban	19,544	53.70	36,397	17,409	60.30	28,874	12.29
CHW	Rural	8,333	20.50	40,643	14,454	29.46	49,066	43.71
	Urban	2,239	32.75	6,838	2,784	37.94	7,338	15.85
Other Unskilled	Rural	67	9.49	703	88	13.54	651	42.68
	Urban	30	17.7	170	39	27.63	142	56.10
No One	Rural	0	0	27,986	0	0	9,513	0
	Urban	0	0	4,427	0	0	1,622	0
Total	Rural	40,852	28.57	1,43,065	54,420	**39.19**	1,38,868	37.17
	Urban	21,814	45.62	47,833	20,233	**53.28**	37,975	16.79

Table 4b. Frequency Distribution of women reporting completion of CoC, according to Service Providers Assisting during ANC in NFHS- 4 & NFHS- 5, across Poor and Non Poor Households

Service Providers	Place of Residence	NFHS- 4			NFHS- 5			Rate of Change between NFHS 4 & 5
		Frequency	%	Total	Frequency	%	Total	
Doctor	Poor	12,937	35.27	36,676	17,736	42.71	41,530	21.09
	Non- Poor	39,301	53.24	73,817	39,802	59.18	67,251	11.16
CHW#	Poor	4,504	15.55	28,968	8,921	25.33	35,222	62.89
	Non- Poor	5,916	32.8	18,035	8,079	38.96	20,740	18.78
Other Unskilled	Poor	41	6.64	615	52	9.86	529	48.49
	Non- Poor	57	21.11	269	78	28.13	277	33.25
No One	Poor	0	0	24,266	0	0	8,067	0
	Non- Poor	0	0	8,256	0	0	3,227	0
Total	Poor	17,481	19.33	90,521	26,709	**31.29**	85,348	61.87
	Non- Poor	45,275	45.12	1,00,377	47,960	**52.42**	91,495	16.18

Table4c. Frequency Distribution of women reporting completion of CoC, according to Service Providers Assisting during ANC in NFHS- 4 & NFHS- 5, across Sc, ST and Non-SC/ST Households

Service Providers	Place of Residence	NFHS- 4			NFHS- 5			Rate of Change between NFHS 4 & 5
		Frequency	%	Total	Frequency	%	Total	
Doctor	SC	8,890	46.32	19,190	10,650	51.84	20,543	11.92
	ST	7,635	42.02	18,179	9,740	49.92	19,513	18.80
	Non-SC/ ST	19,680	46.49	42,332	22,586	53.91	41,897	15.96
CHW#	SC	2,089	21.9	9,536	3,508	28.86	12,158	31.78

Service Providers	Place of Residence	NFHS- 4			NFHS- 5			Rate of Change between NFHS 4 & 5
		Frequency	%	Total	Frequency	%	Total	
	ST	2,609	21.77	11,976	4,318	33.00	13,083	51.58
	Non-SC/ ST	3,899	21.34	18,271	6,304	30.27	20,825	41.85
Other Unskilled	SC	12	8.36	147	31	15.83	199	89.35
	ST	14	5.33	270	25	12.12	203	127.39
	Non-SC/ ST	52	15.59	339	56	22.65	248	45.29
No One	SC	0	0	6,296	0	0	2,371	0
	ST	0	0	7,481	0	0	2,580	0
	Non-SC/ ST	0	0	13,117	0	0	4,055	0
Total	SC	10,990	**31.27**	35,170	14,190	**40.23**	35,271	28.65
	ST	10,253	**27.1**	37,889	14,083	**39.81**	35,379	46.90
	Non-SC/ ST	23,632	**31.92**	74,033	28,946	**43.19**	67,024	35.31

Table 5. Frequency Distribution of women reporting completion of CoC, according to Place of ANC in NFHS- 4 & NFHS- 5

Place of ANC	NFHS- 4			NFHS- 5		
	Yes	%	Total	Yes	%	Total
Away from Home	38,539	41.35	93,201	39,491	46.50	84,935
Close to Home	25,638	38.67	66,304	36,840	45.44	81,080
No Contact	0	0	31,392	0	0	10,828
Total	64,177	**33.62**	1,90,898	76,330	**43.16**	1,76,843

Table 5a. Frequency Distribution of women reporting completion of CoC, according to Place of ANC in NFHS- 4 & NFHS- 5, across Rural and Urban Households

Place Where ANC was Initiated	Place of Residence	NFHS- 4			NFHS- 5			Rate of Change between NFHS 4 & 5
		Frequency	%	Total	Frequency	%	Total	
Away from Home	Rural	22,138	36.24	61,050	24,805	41.39	59,935	14.21
	Urban	14,993	49.46	30,314	12,800	55.79	22,945	12.80
Close to Community	Rural	18,711	34.57	54,121	29,616	42.66	69,420	23.40
	Urban	6,822	52.05	13,108	7,433	55.43	13,408	6.49
No Contact	Rural	0.00	0	27,894	0	0	9,513	0.00
	Urban	0	0	4,410	0	0	1,622	0.00
Total	Rural	40,849	28.55	1,43,065	54,420	39.19	1,38,868	37.27
	Urban	21,815	45.61	47,833	20,233	53.26	37,975	16.77

Table 5a. Frequency Distribution of women reporting completion of CoC, according to Place of ANC in NFHS- 4 & NFHS- 5, across Poor and Non- Poor Households

Place Where ANC was Initiated	Economic Status	NFHS- 4			NFHS- 5			Rate of Change between NFHS 4 & 5
		Frequency	%	Total	Frequency	%	Total	
Away from Home	Poor	8,277	26.57	31,148	10,505	32.63	32,197	22.81
	Non- Poor	29,164	48.11	60,622	27,583	53.77	51,295	11.76
Close to Community	Poor	9,204	26.17	35,174	16,204	35.94	45,084	37.33
	Non- Poor	16,111	51.08	31,540	20,377	55.11	36,973	7.89
No Contact	Poor	0	0	24,200	0	0	8,067	0
	Non- Poor	0	0	8,215	0	0	3,227	0
Total	Poor	17,481	19.31	90,521	26,709	**31.29**	85,348	62.04
	Non- Poor	45,275	45.1	1,00,377	47,960	**52.42**	91,495	16.23

Table 5c. Frequency Distribution of women reporting completion of CoC, according to Place of ANC in NFHS- 4 & NFHS- 5, across Sc, ST and Non-SC/ST Households

Place Where ANC was Initiated	Social Category	NFHS- 4			NFHS- 5			Rate of Change between NFHS 4 & 5
		Frequency	%	Total	Frequency	%	Total	
Away from Home	SC	6,187	38.58	16,036	7,228	44.79	16,136	16.10
	ST	5,268	36.05	14,610	5,969	40.84	14,617	13.29
	Non-SC/ ST	14,842	39.6	37,486	15,784	46.66	33,825	17.83
Close to Community	SC	4,803	37.36	12,858	6,962	41.53	16,764	11.16

Place Where ANC was Initiated	Social Category	NFHS- 4			NFHS- 5			Rate of Change between NFHS 4 & 5
		Frequency	%	Total	Frequency	%	Total	
	ST	69	31.46	15,849	8,114	44.63	18,183	41.86
	Non-SC/ ST	8,789	37.42	23,487	13,162	45.16	29,143	20.68
No Contact	SC	0	0	6,276	0	0	2,371	0
	ST	0	0	7,429	0	0	2,580	0
	Non-SC/ ST	0	0	13,088	0	0	4,055	0
Total	SC	10,990	31.25	35,170	14,190	**40.23**	35,271	28.74
	ST	10,253	**27.06**	37,889	14,083	**39.81**	35,379	47.12
	Non-SC/ ST	23,632	**31.91**	74,060	28,946	**43.19**	67,024	35.35

Table 6. Frequency Distribution of women reporting completion of CoC, according to Timing of ANC during ANC in NFHS- 4 & NFHS- 5

Timing of ANC	NFHS- 4			NFHS- 5		
	Frequency	%	Total	Frequency	%	Total
After 1st Trimester	12,654	28.89	43,809	9,568	31.88	30,011
Within 1st Trimester	51,523	44.53	1,15,697	66,762	49.09	1,36,004
No Care	0	0	31,392	0	0	10,828
Total	64,177	33.62	190898	76,330	43.16	1,76,843

Table 6a. Frequency Distribution of women reporting completion of CoC, according to Timing of ANC during ANC in NFHS- 4 & NFHS- 5, across rural and urban household

Timing of ANC	Place of Residence	NFHS- 4			NFHS- 5			Rate of Change between NFHS 4 & 5
		Frequency	%	Total	Frequency	%	Total	
After 1st Trimester	Rural	7,643	23.41	32,650	6,506	27.27	23,861	16.49
	Urban	4,627	41.61	11,121	2,756	44.17	6,239	6.15
Within 1st Trimester	Rural	33,206	40.24	82,521	47,914	45.42	1,05,494	12.87
	Urban	17,188	53.21	32,302	17,477	58.04	30,114	9.08
No Care	Rural	0	0	27,894	0	0	9,513	0.00
	Urban	0	0	4,410	0	0	1,622	0.00
Total	Rural	40,849	28.55	1,43,065	54,420	39.19	1,38,868	37.27
	Urban	21,815	45.61	47,833	20,233	53.28	37,975	16.82

Table 6b. Frequency Distribution of women reporting completion of CoC, according to Timing of ANC during ANC in NFHS- 4 & NFHS- 5, across poor and non-poor households

Timing of ANC	Poverty Status	NFHS- 4			NFHS- 5			Rate of Change between NFHS 4 & 5
		Frequency	%	Total	Frequency	%	Total	
After 1st Trimester	Poor	3,720	16.83	22,105	3,694	22.02	16,777	30.84
	Non- Poor	8,684	39.74	21,850	5,723	42.05	13,610	5.81
Within 1st Trimester	Poor	13,761	31.12	44,217	23,015	38.04	60,503	22.24
	Non- Poor	36,591	52.04	70,312	42,237	56.57	74,659	8.70
No Care	Poor	0	0	24,200	0	0	8,067	0
	Non- Poor	0	0	8,215	0	0	3,227	0
Total	Poor	17,481	19.31	90,521	26,709	31.29	85,348	62.04
	Non- Poor	45,275	45.1	1,00,377	47,960	52.42	91,495	16.23

Table 6c.Frequency Distribution of women reporting completion of CoC, according to Timing of ANC during NFHS- 4 & NFHS- 5, across SC, ST and Non-SC/ST Households

Timing of ANC	Social Category	NFHS- 4			NFHS- 5			Rate of Change between NFHS 4 & 5
		Frequency	%	Total	Frequency	%	Total	
After 1st Trimester	SC	2,132	26.5	8,045	1,727	28.53	6,055	7.66
	ST	1,862	22.65	8,221	1,536	28.26	5,433	24.77
	Non-SC/ ST	4,573	26.85	17,035	3,692	30.76	12,000	14.56
Within 1st Trimester	SC	8,858	42.49	20,849	12,463	46.43	26,844	9.27
	ST	8,391	37.73	22,238	12,547	45.85	27,366	21.52

Timing of ANC	Social Category	NFHS- 4			NFHS- 5			Rate of Change between NFHS 4 & 5
		Frequency	%	Total	Frequency	%	Total	
	Non-SC/ ST	19,058	43.38	43,937	25,255	49.55	50,968	14.22
No Care	SC	0	0	6,276	0	0	2,371	0
	ST	0	0	7,429	0	0	2,580	0
	Non-SC/ ST	0	0	13,088	0	0	4,055.39	0
Total	SC	10,990	31.25	35,170	14,190	40.23	35,271	28.74
	ST	10,253	27.06	37,889	14,083	39.81	35,379	47.12
	Non-SC/ ST	23,632	31.91	74,060	28,946	43.19	67,024	35.35