BMJ Open

Trends in the utilisation of maternal and child healthcare services from the public and private health sectors in India, 2005–2021: an analysis of cross-sectional survey data

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To cite: Purbey A, Kumar A, Mozumdar A, *et al*. Trends in the utilisation of maternal and child healthcare services from the public and private health sectors in India, 2005–2021: an analysis of cross-sectional survey data. *BMJ Open* 2025;**15**:e082241. doi:10.1136/bmjopen-2023-082241

► Prepublication history and additional supplemental material for this paper are available online. To view these files, please visit the journal online (https://doi.org/10.1136/bmjopen-2023-082241).

Received 17 November 2023
Accepted 07 January 2025

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ABSTRACT

Objectives To estimate the levels and trends of maternal and child healthcare (MCH) service utilisation in India across subsidised and unsubsidised health sectors and to explore total market approach to identify geographies where the private sector has potential to improve MCH services in India.

Design and setting This study used three recent rounds of the National Family Health Survey (NFHS), a cross-sectional survey in India, conducted in 2005–2006, 2015–2016 and 2019–2021. Bivariate analysis and multinomial logistic regression were used to estimate the utilisation of key MCH indicators from subsidised and unsubsidised health sectors. Market sustainability of key MCH indicators was assessed by level of MCH services and subsidisation.

Participants 36 850, 190 898 and 176 843 ever-married women aged 15–49 years, 4440, 22 500 and 15 334 children under 5 years of age with diarrhoea before the survey, and 2552, 6960 and 6117 children with symptoms of acute respiratory infections (ARI) in NFHS 2005–2006, 2015–2016 and 2019–2021, respectively.

Outcome measures The study used three maternal healthcare indicators: women had four or more antenatal care (ANC) visits, had institutional delivery, and received postnatal care (PNC); and two child healthcare indicators: care seeking for ARI and diarrhoea.

Results In India, utilisation of maternal healthcare services increased over the last 15 years: four or more ANC visits increased from 37% to 58% and PNC of mothers increased from 33% to 78% between 2005–2006 and 2019–2021. The results of the multivariate analysis showed that utilisation of ANC (67% from public vs 18% from private health facilities), institutional delivery (64% from public vs 25% from private health facilities) and PNC (73% from public vs 27% from private health facilities) was significantly higher ($p<0.001$) in public than in private health facilities. Care seeking for ARI and diarrhoea among children was significantly higher ($p<0.001$) in private than in public health facilities; care for ARI was 68% in private health facilities compared with 32% in public health facilities.

Conclusions A targeted approach is needed to enhance the competitiveness of private sectors, especially in maternity care markets, to ensure the sustainability of healthcare services in India. Strengthening both the private and public sectors is crucial, with a focus on improving care quality and addressing regional disparities in access to maternal and child health services.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ The study analysed three recent rounds of the National Family Health Survey to advance our understanding of the pattern of utilisation of maternal and child healthcare services from public and private health facilities, using a more comprehensive set of indicators across time, geographies, and different socioeconomic characteristics.
⇒ The study mapped the utilisation of services by health sector at the district level, providing further granular picture of variations within states.
⇒ The study attempted to explore the stage of private sector markets using the total market approach to identify geographies where the private sector has potential to improve provision of maternal and child healthcare services in India.
⇒ Our analyses do not address effective utilisation, sufficiency and quality of services from private and public facilities.

INTRODUCTION

The private health sector is increasingly providing healthcare services in many low- and middle-income countries (LMICs), including India.[1] In India, the healthcare system comprises the public healthcare system, subsidised by the central and state governments, providing free or low-cost care, alongside the private sector, which is typically fee-based. The preference for private sector in terms of accessing healthcare services is due to unavailability of nearby government health facilities, overcrowded public health facilities, perceived poor quality of service provision

within public health facilities, etc.[2] Evidence from South Asian countries documents the importance of private health sector in providing preventive and curative healthcare services to women and children.[3] An increasing use of the private sector for facility-based deliveries and even more so for women in the highest wealth index has been documented in previous studies in six Asian countries and in the analysis of Demographic and Health Surveys (DHS) in 48 developing countries.[4 5] The market of private health sectors can enhance the efficiency and responsiveness of health services, leveraging the diversity of the private sector to provide tailored care that accommodates women with varying financial capacities.[4] With South Asia striving to accelerate progress towards Sustainable Development Goal 3.8, trageting for universal health coverage, the private health sector can play a pivotal role in ensuring equitable advancements in women's and children's health.[3] In comparison to the public sector, proponents of increasing the private sector's involvement have maintained that the private sector may be more effective, sustainable and provide higher-quality services and can serve as a valuable supplement to the frequently inadequate services offered by public health facilities.[4]

Despite the compelling evidence of the importance of private health sectors in providing primary healthcare services, the public sector remained a dominant source and provider of maternal healthcare services. For instance, a multicountry study based on DHS data in LMICs documented the public sector as the main source of antenatal care (ANC) (54%), followed by the private health sector (36%) and at home (5%), although variations within regions exist.[6] Another multicountry study documented that, in low-income countries, women of the highest wealth index use more public facilities for deliveries, while women in the lowest wealth index were most likely to deliver at home and middle-income women were most likely to use the private sector, attributed to social and cultural beliefs and accessibility challenges to health facilities.[7] Previous evidence from India found that, although there is a wide variation in the utilisation of full ANC services and skilled institutional delivery, the public sector has come to prominence across India, especially among women of lower economic strata and poor education, suggesting advancements in improved quality care.[2]

A few previous studies have reported the prominent role of the private sector, especially for the treatment of common childhood illnesses. With respect to childcare seeking practices for diarrhoea and dysentery, multicountry evidence as well as evidence from Bangladesh and rural India showed the private sector as the dominant healthcare provider, contributing 50% to child healthcare, indicating the private sector's ability to cater to diverse economic groups, tailoring healthcare provision based on varying financial capacities.[4 8] Another study from low-middle-income countries across the globe and in South Asian countries, including India, highlighted the relative importance of private and public sectors in providing maternal and child healthcare (MCH) services and found that the public sector played a major role in providing maternal healthcare services, while the private sector showed greater utilisation of services for childhood illnesses such as diarrhoea and pneumonia.[3 4]

India's healthcare system, serving 1.4 billion people, offers diverse medical services. The public or the subsidised sector, funded by the central and state governments, constitutes primary, secondary and tertiary care, where primary care is delivered through various health centres, secondary care provides acute and specialist services via district hospitals, and tertiary care, including specialty services, is offered by medical colleges. On the other hand, the private or the unsubsidised sector encompasses individual practitioners, clinics and corporate hospitals. India's recent health initiatives such as the National Health Mission (NHM) and Ayushman Bharat are aimed at providing financial protection and coverage to vulnerable populations in terms of access to healthcare services.[9] To ensure financial and clinical protection of expectant women seeking care at private facilities, the NHM in India is drawing upon the private sector for healthcare provision'. For instance, Janani Suraksha Yojana (JSY) employs a cost reimbursement model where private health facilities provide free care during childbirth in lieu of government reimbursement, as well as a contracting-in model where specialists from private facilities are contracted to provide care especially for cases needing specialist attention, such as caesarean section deliveries.[6 10]

Engaging the private sector under the NHM is consistent with India's National Health Policy 2017, which emphasises the importance of public–private partnerships (PPP) in the development and implementation of health and family welfare policies and programmes at the national and state levels. Following the introduction of the NHM in India, nearly every state in the country has started accrediting private practitioners under the JSY or other specific NHM programmes to guarantee affordable, high-quality care during childbirth. For instance, the state of Gujarat launched a PPP programme called Chiranjeevi Yojana, with the objective of increasing institutional births and reducing out-of-pocket expenses for low-income and tribal pregnant women by empanelling private practitioners. An urban area-focused example is the Mamta scheme implemented in the National Capital Territory of India, where private facilities were empanelled in the government system to increase access to high-quality care among pregnant women in urban slums.[10]

Previous studies have mostly documented utilisation of MCH interventions in the public and private health sector using older data sets or have covered a few MCH indicators.[2 6–12] However, none of the studies has conducted an analysis of recent evidence and from the lens of a total market approach (TMA) with respect to MCH services. This study includes a comprehensive examination of MCH service utilisation by various disparities not limited to wealth index alone and across three survey periods. This study hence adds to the existing knowledge with the most recent evidence, estimating the levels and trends of

MCH services in India across subsidised and unsubsidised sectors after the launch of the NHM. Further, the study attempts to explore TMA to locate geographies where the private sector has potential to improve MCH outcomes in India. TMA seeks to enhance market sustainability by promoting greater participation from commercial or unsubsidised sectors, while ensuring that free and subsidised services and products are directed exclusively at those unable to afford them.[13] To our knowledge, the principles of TMA have largely been applied to reproductive health markets, making its application to other health products and services, particularly in the context of MCH, a unique and valuable contribution to this field. The findings obtained using the TMA would promote a more efficient allocation of limited resources, ensuring equitable access to maternal and child health services for all.

METHODS

Study population

The data used in this study are subsets of National Family Health Survey (NFHS) 2005–2006,[14] NFHS 2015–2016[15] and NFHS 2019–2021[16] conducted in India. Multirounds of the NFHS are nationally representative cross-sectional surveys that provide reliable estimates on demographic and health indicators, including fertility and family planning; child mortality, morbidity and nutrition; utilisation of maternal healthcare services; etc. While NFHS 2005–2006 provides an estimate of these indicators at the national and state levels, the subsequent NFHS provide an estimate of these indicators at the district level as well. This survey provides robust evidence and supports policymakers in setting benchmarks, tracking progress and identifying health programme needs.

The NFHS adopted a multistage sampling design, stratified by urban–rural areas: a two-stage sample design in most rural areas and a three-stage sample design in most urban areas. The survey collected data using a household schedule and eligible women/individual schedule. NFHS 2019–2021 gathered information from 636 699 households, 724 115 women and 101 839 men; NFHS 2015–2016 gathered information from 601 509 households, 699 686 women and 103 525 men; and NFHS 2005–2006 gathered information from 109 041 households, 124 385 women and 74 369 men. Individual women's response rates were 95% in NFHS 2005–2006 and 97% each in NFHS 2015–2016 and NFHS 2019–2021. Details of the sampling design, sample size estimation and response rates are given in the reports of the various rounds of the NFHS.[14–16] This study has the following analytical sample sizes, respectively, from NFHS 2005–2006, NFHS 2015–2016 and NFHS 2019–2021: 36 850, 190 898 and 176 843 ever-married women aged 15–49 years; 4440, 22 500 and 15 334 children who had diarrhoea in the 2 weeks before the survey; and 2552, 6960 and 6117 children under 5 years of age with symptoms of acute respiratory infection (ARI). The study collected information on children of women who gave birth to the child in the last 5 years prior to the survey'. Different subsets of women and children were surveyed in each wave of the NFHS, representing various sampling groups across the three survey rounds.

Measures

Outcome variables

In this study, sources of MCH service utilisation for five critical indicators were considered as key outcome variables.

Sources of MCH service utilisation

Sources of MCH service utilisation were defined as follows:

- Public health facilities: Public health facilities include any government hospitals, dispensary, health centres at all levels, anganwadi centres, village clinics, government mobile clinics, public camps and other public facilities.
- Private health facilities: For maternal health indicators, private facilities include any private hospital/maternity home/clinic, non-governmental organisation (NGO) or trust hospital, and other private sector health facilities. For child healthcare indicators, ARI and diarrhoea, private facilities include private hospital/clinics (9% and 13%), private pharmacies (3% and 4%), private doctors (20% and 25%), private paramedics (1% and 1%), private AYUSH (Ayurveda, Yoga and Naturopathy, Unani, Siddha and Homeopathy) (0.2% and 0.1%), and other private facilities including NGOs or trust hospitals (1% and 1%).
- Others : This include 'home/others' for maternal care indicators, and additionally 'shop, traditional healer, friend/relative, other' for care seeking for ARI and diarrhoea.

It is important to mention that information regarding place of postnatal care (PNC) is not collected; therefore, place of delivery has been taken as a proxy for receiving PNC within 48 hours of childbirth, as women giving birth in an institution are supposed to be discharged after 48 hours from delivery.

The following were the key maternal and child health indicators studied:

- Four or more ANC visits: Four or more ANC visits is defined as the percentage of women aged 15–49 who visited health providers/facilities at least four times during their last pregnancy. This indicator was calculated for the total women aged 15–49 who had a live birth in the last 5 years preceding the survey during pregnancy for the most recent live birth.
- Institutional delivery: Institutional delivery is defined as the percentage of women who delivered live births in a health facility. This indicator was calculated for women aged 15–49 who had a live birth in the last 5 years preceding the survey during pregnancy for the most recent live birth.
- PNC for mother: PNC is defined as the percentage of women who received postnatal check-ups within the first 48 hours of delivery. PNC was calculated for

women aged 15–49 who had a live birth in the 5 years preceding the survey during pregnancy for the most recent live birth.

- Care seeking for diarrhoea among children: Care seeking for diarrhoea is defined as the percentage of children under 5 with symptoms of diarrhoea in the 2 weeks before the survey, and among these children the percentage for whom advice or treatment was sought for symptoms.
- Care seeking for ARI among children: Care seeking for ARI is defined as the percentage of children under 5 with symptoms of ARI in the last 2 weeks prior to the survey date, and among these the percentage for whom advice or treatment was sought. ARI symptoms in the 2 weeks prior to the survey include symptoms of short, rapid breaths and problems in the chest, or problems in the chest and a blocked or running nose.

Women's data files were used to estimate ANC, institutional delivery and PNC, while kids/children data files were used to determine treatment seeking for ARI and diarrhoea among children under 5 years of age. These data files contain data in a standard, easy-to-analyse format with almost similar common variable names and coding categories in all three rounds of the NFHS for easy comparability.

Predictor variables

The key predictors considered in this study are place of residence (urban, rural), wealth index (poorest, poorer, middle, richer, richest), mother's age at birth (15–19 years, 20–29 years, 30+ years) and mother's education (up to 5 years of schooling, 5–10 years of schooling, 11+ years of schooling). Previous studies have used wealth index and place of residence while examining the pattern of healthcare use by public and private sector.[3 4 12 17] These four confounding variables are closely associated with utilisation of any healthcare service, primarily MCH, from public versus private health sector (online supplemental table S1). Other socioeconomic and demographic variables such as caste, religion, parity and household decision-making by women were adjusted in the analysis while examining the effect of the key predictors to assess MCH service utilisation from public, private and other health facilities. Household decision-making by women includes household decision-making power on their own healthcare, large household purchases and visits to family or relatives.

Analysis

Bivariate and multivariate analyses

Bivariate analysis was applied to estimate trends in the proportion of ANC visits (0–3 ANC visits=0, ≥4 ANC visits=1), institutional delivery (delivery in public or private healthcare facilities=1, otherwise=0), PNC for the mother (received PNC within 2 days of the last birth=1, otherwise=0), and care seeking for diarrhoea (sought treatment for diarrhoea symptoms in the 2 weeks before the survey=1, otherwise=0) and for ARI (sought treatment for ARI symptoms in the 2 weeks before the survey=1, otherwise=0) over time across public–private, and health facilities by household wealth index, urban–rural residence, mother's education in years of schooling and mother's age at childbirth.

To understand the effect of the selected predictors on the source of MCH service utilisation, we used multinomial logit regression considering the nature of the dependent variable (source of MCH use), as it has more than two mutually exclusive categories, that is, use of MCH services from public health facilities, use of MCH services from private health facilities and use from other sources. The logit model allows the effects of an independent variable to differ for each outcome and handles the non-independence of the categories of the dependent variable by simultaneous estimation of the models for all outcomes. The multivariate analysis was adjusted for parity of women, caste, religion and household decision-making. To avoid complexity of interpretation, the results obtained from the multinomial logit regression were presented in terms of adjusted percentage using multiple classification application. For the multinomial logistic regression model, the most popular stata command *mlogit* was used.

TMA indicators

The potential role of the private health sector in providing MCH services was examined using an approach called TMA, which aims to enhance market sustainability by increasing the involvement of the commercial or unsubsidised sector for those who can afford to pay, while providing free and subsidised services and products from the public sector for needy consumers.[18 19] Market size, market equity, market accessibility and market sustainability are the four major market characteristics that should be monitored to follow a market's growth and maturity. TMA was employed in terms of market sustainability using data from NFHS 2019–2021 only and drawing the references from the classification of the total market initiative proposed by the 'Reproductive Health Primer' and similar studies on family planning.[13 18] As our study already brings about understanding of utilisation of MCH services across time and across different socioeconomic characteristics, and while there are no direct data on market accessibility, we have restricted our analysis of TMA to market sustainability indicators, given continuous and long-term efforts by the NHM to increase coverage of key healthcare services. Three metrics should ideally be used to evaluate the Indian healthcare market's sustainability, or its capacity to support itself: (1) the overall market value, which is the total economic size of the healthcare market, measured by revenue generated from healthcare services and products; (2) the market share possessed by market leaders, which is the proportion of the healthcare market controlled by public, private and other providers; and (3) market subsidies, which is the extent of government or donor support in funding healthcare services, such as free or low-cost treatments in public facilities or

subsidised insurance schemes.[15] While these indicators should be assessed annually, comprehensive assessments of market sustainability, including detailed evaluations of supply sources and long-term market shifts, should occur every 3–5 years. The Indian healthcare market's sustainability is evaluated in this research using the level of MCH service utilisation and subsidisation using the NFHS 2019–2021 data set.

Each of the 707 districts of India was categorised into one of the three stages of MCH market development: early (low level of MCH service utilisation, low willingness to pay for MCH services, irregularity in service provision and market share dominated by the public or subsidised sector), developing (increasing or consistent users of MCH services, increasing number of service providers, more commercial provision of services, but share of subsidised source >50%) or mature (medium to high numbers of MCH users, multiple sources of services, good access to services and share of subsidised source <50%).[13 18] For the market approach, only services used from the public and private sectors alone were considered, removing the 'others' category from all the indicators to avoid misclassification of the districts. The cut-offs for the three stages were defined based on the prevalence of selected indicators at the state level estimated from NFHS 2019–2021, approximating the lower (45%, 65%, 60%, 40% and 60%) and middle (70%, 85%, 80%, 70% and 80%) for prevalence of four or more ANC visits, institutional delivery, PNC for mothers and treatment seeking for ARI and diarrhoea in children, respectively. The details of classification of districts by their stage of market development are given in online supplemental table S2. District maps were generated for each of the five indicators based on the stages of market development in stata using the *spmap* command. All analyses were performed using the statistical software Stata/MP V.15.1 (StataCorp, Texas, USA). As the NFHS uses a multistage sampling design, all the values reported in the study were estimated after applying appropriate weights.

Patient and public involvement

None.

RESULTS

Trends in MCH service utilisation by public and private health sectors

Utilisation of maternal healthcare services increased in India over the past 15 years. For instance, four or more ANC visits increased from 37% (n=36 850) to 58% (n=176 843), institutional delivery increased from 41% (n=36 850) to 90% (n=176 843), and PNC increased from 33% (n=36 850) to 78% (n=176 843), from 2005–2006 to 2019–2021, respectively (table 1). Similarly, care seeking for diarrhoea also increased from 69% (n=4440) to 76% (n=15 334) during the period. Care seeking for ARI, though, decreased from 75% (n=2552) to 56% (n=6117). Trends in the receipt of services by public and private sector showed that the private sector remained the prime source of care for diarrhoea and ARI treatment over time. However, for maternal healthcare services, the private sector was the dominant source of care in NFHS 2005–2006, but in the subsequent years thereafter utilisation from the public sector increased.

Table 1 Utilisation of selected maternal and child healthcare services by type of health facilities in India, 2005–2021

Maternal and child healthcare services	2005–2006	2015–2016	2019–2021
Four or more ANC visits (%)			
Total	36.9	51.2	58.4
Public	13.7	25.1	33.0
Private	18.2	16.1	12.3
Other	4.9	9.9	13.1
Institutional delivery (%)			
Total	41.4	81.1	90.0
Public	19.0	52.6	61.8
Private	22.4	28.4	28.1
Other	0.0	2.2	0.0
PNC check-up for the mother (%)			
Total	33.1	65.0	77.7
Public	14.2	38.9	52.2
Private	18.8	23.8	25.4
Other	0.0	2.2	0.0
Unweighted number (women aged 15–49 who had a live birth in the 5 years preceding the survey during pregnancy for the most recent live birth)	36 850	190 898	176 843
Care seeking for ARI among children (%)			
Total	75.4	86.0	56.5
Public	9.7	19.0	15.7
Private	56.4	62.3	38.7
Other	9.2	4.6	2.0
Unweighted number (children under 5 years with symptoms of ARI in the 2 weeks before the survey)	2552	6960	6117
Care seeking for diarrhoea among children (%)			
Total	69.0	77.4	76.3
Public	12.3	17.9	23.2
Private	45.8	54.0	50.8
Other	10.8	5.46	2.2
Unweighted number (children under 5 years who had diarrhoea in the 2 weeks before the survey)	4440	22 500	15 334

ANC, antenatal care; ARI, acute respiratory infection; PNC, postnatal care.

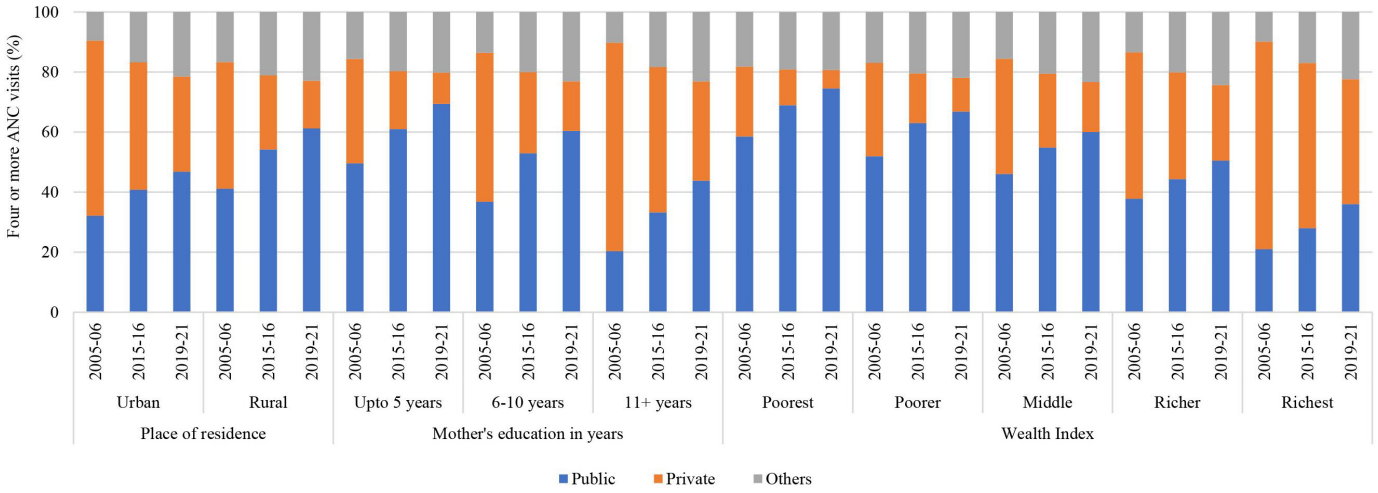

Figure 1 Trends in four or more antenatal care (ANC) visits by type of health facilities across selected socioeconomic characteristics in India, 2005–2021.

Socioeconomic pattern in MCH service utilisation by public and private health sectors

Findings showed that women from well-off families were using MCH services from the private sector, whereas women from poorer households were using the public sector. For instance, in 2019–2021, among the richest women, 42% (n=17 474) used ANC services, 58% (n=40 280) gave birth and 60% (n=36 625) had PNC in private health facilities, and 36% (n=65 141) used ANC services, 39% (n=114 952) gave birth and 40% (n=98 077) had PNC in public health facilities (figures 1–3, online supplemental table S3). On the contrary, among the poorest women, 75% (n=65 141) used ANC services, 69% (n=114 952) gave birth and 88% (n=98 077) had PNC in public health facilities, and 6% (n=17 474) used ANC services, 9% gave birth (n=40 280) and 12% (n=36 625) had PNC in private health facilities. Similarly, women from urban areas, highly educated women and older women were using the services more from the private sector compared with rural, less educated and younger women, respectively.

In case of care seeking for children, the private health sector was the dominant source across the households wealth index . For instance, more than 60% of children of either the lowest and the highest wealth index sought treatment for ARI and diarrhoea from private facilities and less than 35% sought treatment from public facilities (figures 4 and 5, online supplemental table S3). The care seeking for ARI and diarrhoea was higher in private than in public health facilities, in urban areas than in rural areas and across all levels of mothers' age and education.

Multivariate analysis

The findings showed that utilisation of health services, such as four or more ANC visits, delivery and PNC for mothers, was significantly higher (p<0.001) in public health facilities (67%, 64% and 73%, respectively) than in private facilities (18%, 25% and 27%, respectively) and across urban–rural areas, all women age groups and all levels of education. Across wealth index, only women from the richest quintile availed institutional delivery (52%) and PNC (55%), more so in private facilities, while

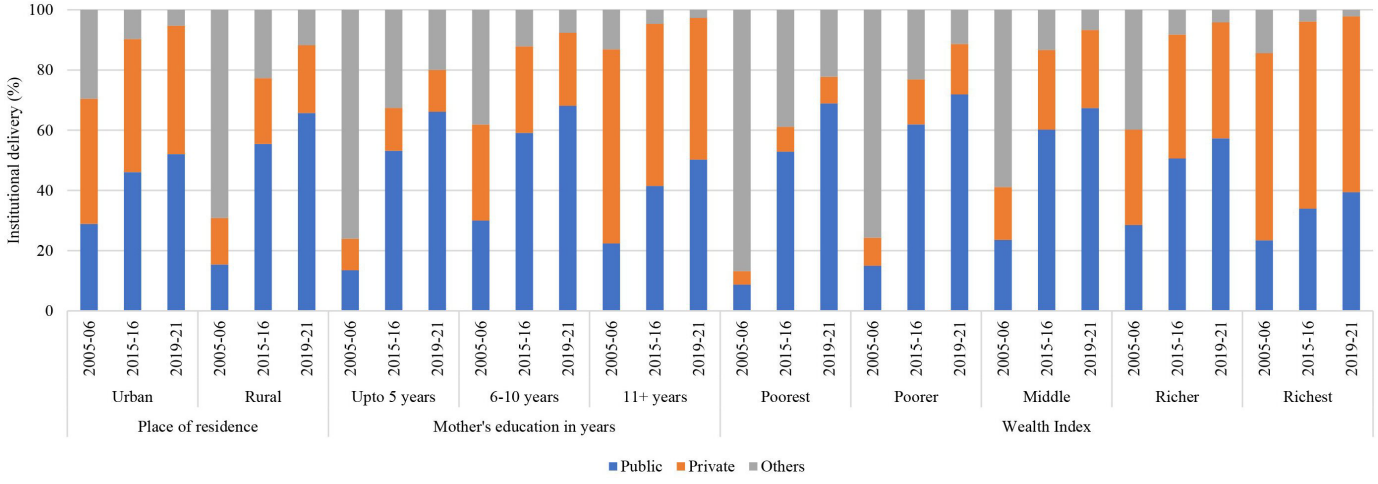

Figure 2 Trends in institutional delivery by type of health facilities across selected socioeconomic characteristics in India, 2005–2021.

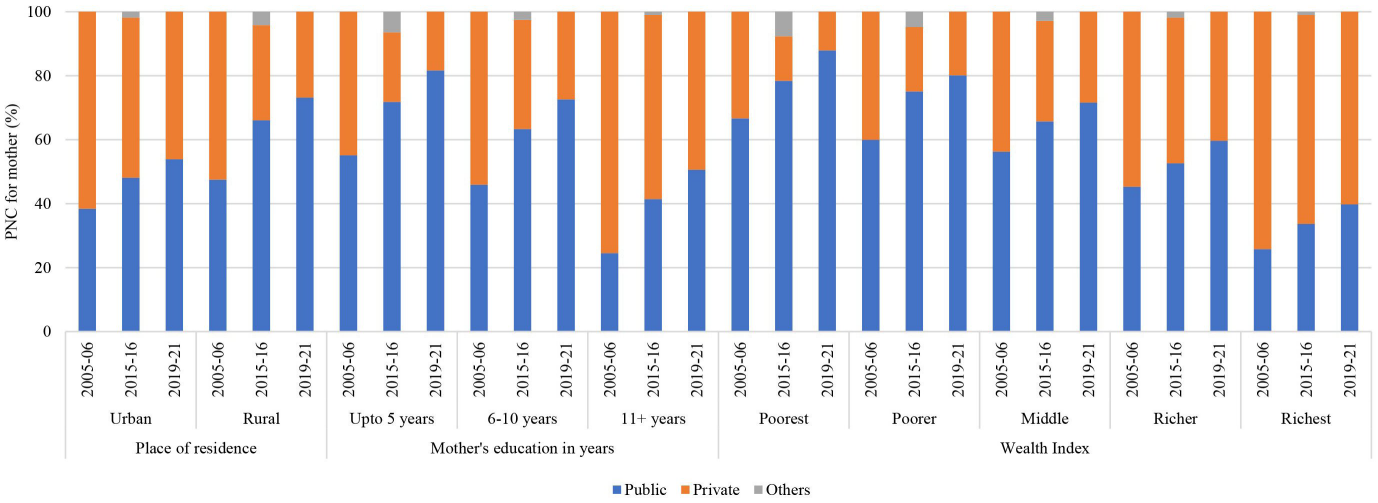

Figure 3 Trends in postnatal care (PNC) of mothers by type of health facilities across selected socioeconomic characteristics in India, 2005–2021.

women of other wealth index used these services mostly from public health facilities. During NFHS 2005–2006 and NFHS 2015–2016, it was observed that urban and educated women availed maternal healthcare services more in the private health sector compared with the public sector, but in NFHS 2019–2021 it was no longer the case, as these groups also showed increased utilisation of healthcare services from the public sector. Care seeking for ARI and diarrhoea was substantially higher in the private sector (68% and 63%, respectively) than in the public sector (32% and 34%, respectively), and across urban and rural residence, women age groups, education level and wealth index. The private sector has been the dominant source for treatment of childhood illnesses for the past 15 years, but the gap between the public and the private sector has been decreasing in recent years (online supplemental table S4).

Private sector market development for MCH services across states and districts

Using the TMA analysis, each state and each district of India were classified into one of the three groups by the stage of development of their MCH market: early, developing and mature (online supplemental table S5). State-level findings showed that, except for Kerala, for all three maternal healthcare services, and Gujarat for institutional delivery and PNC, which were at the mature stage, the private sector market for maternal healthcare in all states were at the developing stage. For treatment seeking of childhood diseases, the private sector market in most of the states was at the 'developing stage'. States such as Nagaland, Chhattisgarh and Tamil Nadu were at the early stage of market development for care seeking for ARI.

The level of private sector market stages across districts showed that most of the districts (>85%) were at the 'developing' stage for four ANC visits, institutional delivery and PNC for mothers. For care seeking for ARI and diarrhoea, most districts were also at the developing

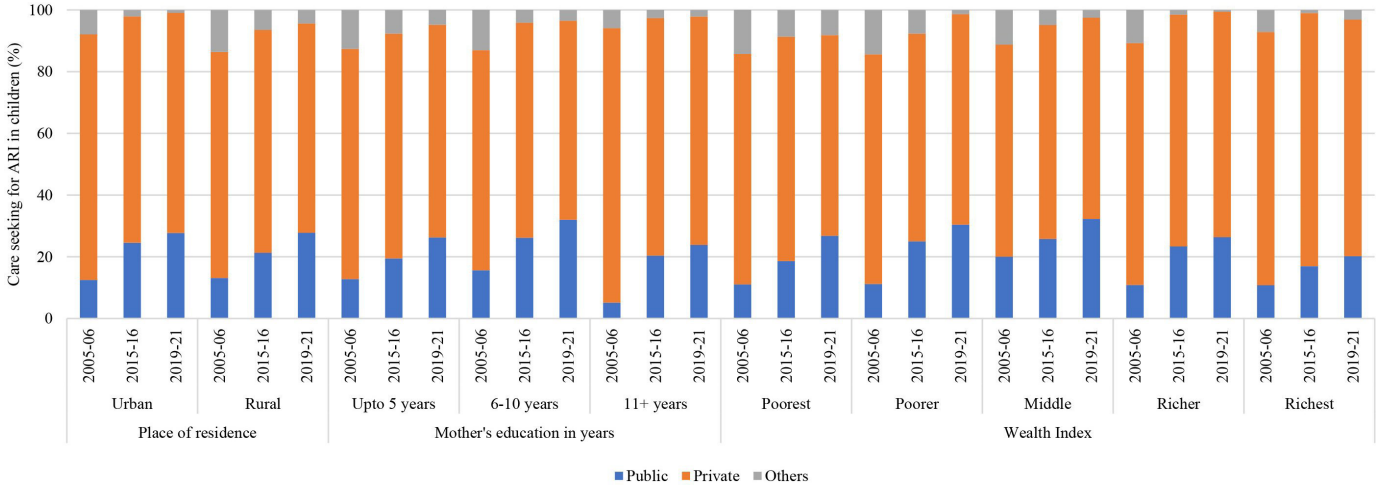

Figure 4 Trends in care seeking for acute respiratory infection (ARI) by type of health facilities across selected socioeconomic characteristics in India, 2005–2021.

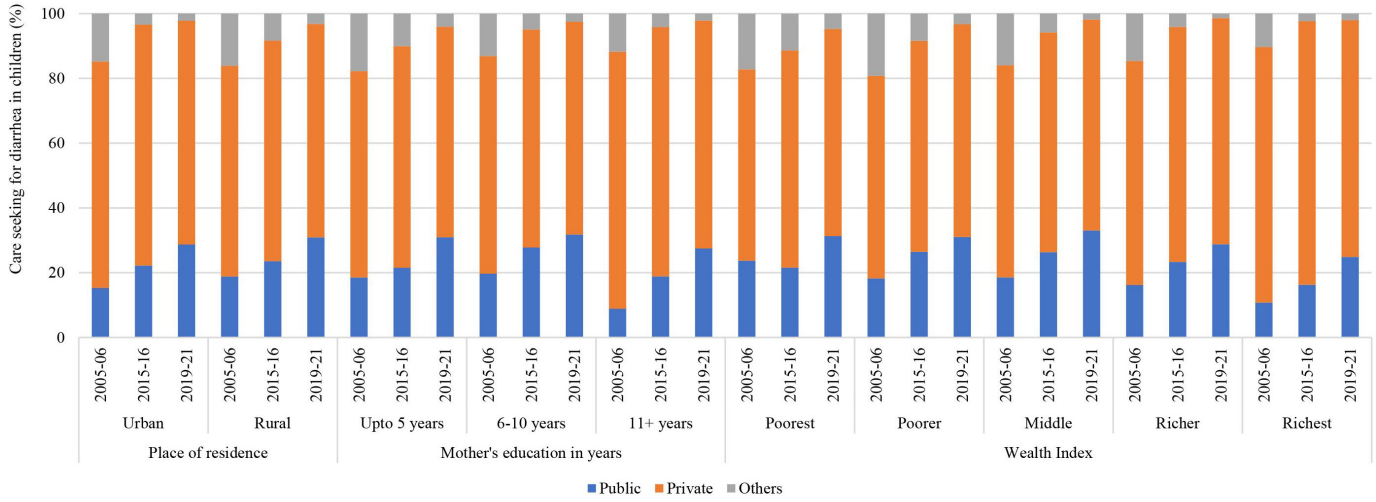

Figure 5 Trends in care seeking for diarrhoea by type of health facilities across selected socioeconomic characteristics in India, 2005–2021.

stage (>60%) (online supplemental table S5). For four or more ANC visits, the market was in the 'mature' stage in most districts of Kerala and Telangana, and in some districts of Andhra Pradesh, Maharashtra and Gujarat. For institutional delivery and PNC care for mothers, only one district in Manipur, Ukhrul, was at the 'early' stage, while most districts of Kerala, Gujarat and Telangana, and some districts of Andhra Pradesh, Maharashtra and Punjab, were at the 'mature' stage. In the case of care seeking for ARI among children, most districts of Uttar Pradesh (UP) and some districts of Punjab, Haryana, Nagaland, Manipur, Maharashtra and Jharkhand were at the 'early' stage, while most districts of Bihar, West Bengal and Gujarat were at the 'mature' stage. Districts of Madhya Pradesh, Tamil Nadu, Telangana and Karnataka were at mixed stage of market development—both at early and mature stages. For care seeking of diarrhoea among children, most districts from Tamil Nadu were at the 'early' stage, while most districts of Punjab, Haryana, Uttarakhand, Rajasthan, UP, Delhi and Bihar and some districts of Telangana, Maharashtra, Karnataka, Andhra Pradesh and West Bengal were at the 'mature' stage (online supplemental figures S1–S5).

DISCUSSION

Findings of this study showed that public health facilities have remained the main source for ANC, institutional delivery and PNC services. Although the private sector was dominant in catering to institutional delivery and ANC until the year 2003, public sector utilisation after the start of the National Rural Health Mission (NRHM), that is, after 2005, has increased since then.[2] Furthermore, over the course of the last 15 years, trend analysis suggests that even the most educated and urban women have switched from private to public sector for maternal care, helping reduce disparities in utilisation of public health services. The estimates from the NFHS 2019–2021 likely point to the consistent efforts of the NRHM in strengthening the public health facilities in providing quality MCH services. With the complete roll-out of Ayushman Bharat and Pradhan Mantri Surakshit Matritva Abhiyan in the near future, it is likely that utilisation of MCH services in public health facilities may further increase.

Although there has been an increase in the share of the public health sector in healthcare service utilisation, particularly for maternal healthcare, private health facilities remained the preferred source of care for ARI and diarrhoea. Previous research has indicated that the private sector continues to play a significant role in treating childhood illnesses; nevertheless, the evidence on the public sector's treatment trends for childhood illnesses is still poorly understood.[3 4] Even for children of the poorest houses, treatment for ARI and diarrhoea is still sought from private health facilities, mostly from private retail outlets such as pharmacies, which may not always adhere to the standard protocol for treatment, putting these children at risk of receiving poorer quality care than their wealthier counterparts.[20] The private sector remains a dominant player in providing care for diarrhoea and ARI among children of all population segments. This may be possible as public health facilities may be understaffed or lack essential resources, which could affect the treatment of diarrhoea and ARI. Further, healthcare providers in public health facilities in India may lack adequate knowledge of ARI treatment guidelines, which might influence the appropriateness of care provided to children with ARI. Also, families may prefer to seek treatment for diarrhoea and ARI from private health facilities even if they are more expensive, possibly due to perceived higher quality of care, provision of service and provider availability for longer duration in a day. Private health facilities may also be preferred due to better infrastructure, shorter waiting times and greater attention from healthcare providers, especially in the wealthiest section.[3 21] However, a study from a rural setting in North India has highlighted challenges to adequate treatment of childhood diarrhoea

among private sector providers due to overprescription of antibiotics and antidiarrhoeals.[22] Urban and wealthier women were much more likely to use the private sector than rural and poorer women.[4 20 23]

While there is an increasing trend in utilisation of MCH services from the public health facilities, disparities in the use of health services by different population segments exist. Our results commensurate with previous studies that documented ANC and institutional delivery peaked in the public sector from 1998–1999 to 2007–2008, or after the start of the NRHM, that is, in 2005.[2] Previous studies have suggested a natural progression in some healthcare services, in which countries first increase their use of the private sector as they transition to middle-income status and then reduce this use with increased income levels as social safety nets expand to provide more benefits to greater segments of the population.[4] This is where a market approach analysis may be useful in the subsidisation of targeted groups or rural areas and the poor than in urban areas with those who can afford to pay. India's market of maternity care services is largely dominated by the public sector and subsidised by government schemes, which may restrict the opportunity for the private sector to grow. There have been larger focused efforts on strengthening the public health sector through the launch of different schemes, such as the JSY, Janani Shishu Suraksha Karyakram and Rashtriya Bal Swasthya Karyakram, to provide accessible, affordable and quality healthcare to the rural population and especially to marginalised groups, despite the potentially substantial part the private sector could still play to increase MCH utilisation and equity and the transition towards private or sustainable sources of supply. It might not be possible to achieve the targets through public sector expansion alone over a finite time frame.[24 25]

The TMA analysis highlights substantial geographical disparities in the development of private sector healthcare markets across India. For instance, regions such as Kerala and Gujarat show mature markets for maternal healthcare, reflecting greater private sector penetration. In contrast, states like UP and Bihar remain in the early stage of market development, particularly for child healthcare indicators such as treatment seeking for ARI. The survey data also confirm that urban areas and wealthier districts are more likely to use private healthcare, while rural and impoverished districts rely on public health services. This variation suggests that private sector development is often constrained by economic and infrastructure challenges in less affluent regions. The market for maternal health services for ANC, delivery and PNC in India shows that about 85% of the districts in the country are still in the 'developing' market stage, where the market is large enough but there are not enough users who are willing to pay for the products and services. In terms of these three maternal health services, private sector use was more prominent in the districts of the western and southern states of the country, while private sector use for care seeking for ARI and diarrhoea was very heterogeneous across the districts. For maternal care, there are too few districts at the 'early' stage; however, for care seeking for ARI, there are around 126 districts where demand generation could help develop the private sector market. MCH initiatives must continue to increase demand and identify ways to improve utilisation because most districts of India are at the 'developing' stage of the market. It was observed through our study that higher percentages of women from urban areas and belonging to a richer quintile were still obtaining maternal healthcare services from subsidised sources. There may be less need for subsidies in districts that are at mature stages of market development (30 districts for four or more ANC visits, 78 districts for institutional delivery, 75 districts for PNC for mothers, 151 districts for treatment of ARI and 162 districts for treatment of diarrhoea are at 'mature' market stage), except for urban and rural poor. The high utilisation of private sector services for ARI, despite the market being less developed, can be explained by the structure and characteristics of care provision, as a significant proportion of care seeking in the private sector is directed towards pharmacies and informal providers, which are more accessible and affordable in some regions, although they may lack quality assurance, and families often perceive private providers as offering better care, shorter waiting times and higher availability, even if the formal private healthcare market lacks structural development. The effectiveness of TMA varies depending on market context. For instance, in districts with early-stage markets, demand generation and subsidisation are crucial to stimulate private sector growth. In more mature markets, private providers can sustain services without significant subsidies, reducing the burden on public facilities. This is particularly evident in parts of southern and western India, where private sector maternity care is well established. This targeted approach to subsidisation might as well be applied in districts at the developing stage of market development. TMA is also a recommended strategy adopted in other LMICs to strengthen the supply chain for reproductive health and improve access.[26] Hence, the programme might consider providing subsidised services to low-income consumers and shift its focus from public to private sector for those groups of the population who can afford it.

Findings of this study should be interpreted by keeping the following limitations in mind. First, the data only apply to five healthcare services, and the findings should not be used to make broad statements about healthcare provision in general and preferred sources of care. Second, the sources of MCH service are self-reported and hence may not necessarily be the preferred source. The NFHS data are also self-reported, so there might be possible misclassifications/

errors in the sources used. Third, the private sector provider classification included both for-profit and not-for-profit clinics, such as NGOs, where the cost would be similar to that of public sector care. Fourth, our analyses do not address effective utilisation, or the sufficiency and quality of care provided in private and public facilities. It is likely that the results are hiding large differences in the quality of care across different types of facilities. The study also concentrates specifically on market sustainability indicators, drawn from the broader market characteristics of size, equity and accessibility that should be monitored to follow the market's growth and maturity, as recommended by the Market Development Approaches Working Group of the Reproductive Health Supplies Coalition. Also, market sustainability should be evaluated using three metrics: the overall market value, the market share possessed by market leaders and the market subsidies. However, since the NFHS does not have data for the first two variables, we evaluated market sustainability using the level of MCH service utilisation and subsidisation.

CONCLUSION

While public facilities are an important source of healthcare for many families in India, there may be challenges to providing adequate treatment for diarrhoea and ARI among children. However, the public sector still shows a slight increase in the utilisation of childcare services, considering broader public health improvements made under the NRHM. It is important for healthcare providers and policymakers to address these challenges and ensure that all children receive appropriate care. Even though there is a growing trend in using public health services for MCH, demonstrating the efficacy of government interventions, the public health system may face long-term strain if the shift from private to public sector continues. This will increase the footfall in the public health facilities and make them overburdened. Strengthening or enhancing the private sector could be important in maintaining the long-term sustainability of healthcare service provision. With the private sector continuing to be a dominant provider for treatment of ARI and diarrhoea among children, regulating the quality of care may become increasingly important. The government may consider efforts to strengthen both the private and public sector. The findings of this total market analysis in terms of market sustainability suggest that India needs different strategies for different MCH service provision to capitalise on the potential of the private sector market. 126 and 59 districts at the early stage in care seeking for ARI and diarrhoea, respectively, need subsidised services to continue to generate demand. A targeted approach is required by private financing agents to make the private sector more competitive in the developing markets, especially in terms of maternity care services. The districts categorised in the 'mature' stage of market development for maternity care services can be further studied for best practices in private healthcare delivery. A more detailed and comprehensive analysis of the healthcare market is essential to fully understand the dynamics between public and private sector utilisation and identify areas requiring improvement to ensure market sustainability for provision of MCH services.

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Acknowledgements The authors acknowledge Dr Fred Arnold, Technical Deputy Director, DHS Program, for taking the time and effort to review the article. The authors sincerely appreciate all valuable comments and suggestions, which helped improve the quality of the manuscript.

Contributors AK and AP conceived and designed the study. AP curated the data and conducted formal analysis. AP and AK validated the data and drafted the paper. AK, AM, PM, RA and NS reviewed and edited the paper. AK supervised the study. NS and PM administered the project. All authors read the drafts of the manuscript and approved the final version. AP is the guarantor of the paper.

Funding This paper was prepared as part of the Research and Analysis for Scientific Transformation and Advancement (RASTA) initiative of the Population Council, with funding received through ICF Macro's DHS-8 contract with the US Agency for International Development (USAID) under the terms of cooperative agreement number 7200AA18C00083. The contents of this paper are the sole responsibility of the authors and do not necessarily reflect the views of the USAID, the US Government or the Population Council. The funding partner was not involved in research design, analysis and interpretation of data, writing the report and in the decision to submit the paper for publication.

Competing interests None declared.

Patient and public involvement Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

Patient consent for publication Not required.

Ethics approval The analysis carried out in this manuscript used secondary data of three recent rounds of the NFHS, available in the public domain. Details of ethical considerations in the NFHS can be found in the full report of all three rounds of the NFHS (http://rchiips.org/nfhs/). No ethical approval was sought for this analysis as the data were part of routine monitoring and can be freely accessed online.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement Data are available upon reasonable request. Our data are from the Demographic and Health Surveys, freely available at https://dhsprogram.com/Data/.

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