Research Paper

Access to women physicians and uptake of reproductive, maternal and child health services in India

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1. Introduction

Access to doctors and other health providers in rural, remote and poorer areas is a global concern [1–9]. However, physician maldistributions disproportionately impact primary health care in low- and middle-income countries (LMICs) such as India that are striving to achieve global development targets [1,4,5,7,10–13]. Deficits in physician availability have hindered Indian states' progress toward achieving universal health coverage and reproductive, maternal and child health (RMCH) targets. Issues of availability of women physicians in rural settings in particular need urgent attention. Workforce audits show glaring regional, rural-urban and socioeconomic imbalances in doctor-patient ratios but neglect the intersectionality with gender inequities in the health system that can influence the implementation of RMCH programs across states [13]. Globally, there is also growing concern regarding the challenges faced by women health-care providers, be it physicians, nurses or community health workers,
Research in context

Evidence before this study

Post the National Rural Health Mission (NRHM) in India, there has been an emphasis on increasing the number and strengthening the role of women community health workers along with addressing systemic and social barriers to their service delivery. In contrast, the value of increasing access to women physicians and challenges to their work are less understood. In many contexts, there may be a preference for gender-matched providers, particularly in more traditional contexts such as rural India where women’s health seeking remains low.

Even as global literature suggests that women feel greater comfort discussing ailments of an intimate nature with a woman doctor, the association of women physician availability with maternal and child health care utilization has not been systematically examined in India. Increasing access to women physicians may be a particularly difficult challenge given the overall lower availability of physicians as well as of women physicians in rural contexts. The Indian government, recognizing the importance of women physician access, has designated slots for a Lady Medical Officer (LMO, i.e., a woman physician) at each of its Primary Health Centers serving rural India. Using triangulated data from two nationally representative surveys from India, we examined whether women physician (i.e., LMOs at PHCs) availability was associated with maternal and child health service utilization at the district level, adjusted for markers of socioeconomic status.

Added value of this study

Geographic and socioeconomic inequities in access to doctors occupy the health workforce discourse, but greater recognition is needed for the intersectionalities with gender. This is among the first studies in India that provides evidence for the value of women physician availability in improving health care utilization outcomes. Gender gaps in doctor availability and subsequently the challenges faced by women physicians working in low resource settings need systematic recognition as calls for more representation of women physicians in improving health care utilization outcomes. Even as empirical evidence from other contexts shows some differences in preventive care and health screening based on physician gender but not for reproductive services [27–29].

Our goal was to improve the understanding of whether access to women doctors can improve health service uptake in the Indian context. To this end, we examined the association between women physician availability and RMCH indicators in India, adjusted for urbanicity, socioeconomic status and women’s higher education using data from two national surveys.

2. Methods

2.1. Study design

We analyzed cross-sectional data from the National Family Health Survey (NFHS) 2015–16 [30] and the District level Household and Facility Survey (DLHS) 2012–13 [31]. The National Family Health Surveys (NFHS) are part of the global Demographic and Health Surveys (DHS), conducted by the IIPS (Mumbai), with support from the Ministry of Health and Family Welfare (MoHFW), Government of India and ICF International Inc [30]. These surveys provide an opportunity to understand determinants of reproductive, maternal and child health in the delivery of their professional duties. These challenges include discriminatory behavior in recruitment, lower pay, lack of authority and threats of violence, leading to lower intake and higher dropping out of service among women [7,13–15]. Recent cross-national analyses have also highlighted the devaluation faced by women in the health system through gender inequitable norms around prestige, salary and opportunities for advancement [16]. Health systems across LMICs face shortages of women doctors and health staff in rural settings, which are often considered challenging or remote posts. Rural postings are also associated with more inequitable gender norms, lower value to women’s educational and work status and harder access to public infrastructure [17]. Medical training schools are often located in urban centers and women doctors report balancing of work with domestic responsibilities as reasons for their unwillingness to be stationed in far-off rural locations [18,19]. To counter physician shortages more broadly, the National Health Mission (NHM, previously National Rural Health Mission (NRHM)) in India adopted approaches such as contractual hiring, incentives for physicians to serve in remote areas and for states to increase staffing and medical education policies for increasing under-represented groups [20]. Despite these efforts, not enough doctors, particularly women doctors are available in primary care systems. Recommendations by the Indian Public Health Standards (IPHS)1 to improve health service access, specifically aimed at increasing health seeking among rural women comprise the mandatory inclusion of one woman doctor (officially referred to as a Lady Medical Officer (LMO)2) [21–24] per three physicians at each primary health center (PHC) [21,25,26]. In India, we are aware of no studies that have examined relationships between physician gender and health service use, even as empirical evidence from other contexts shows some differences in preventive care and health screening based on physician gender but not for reproductive services [27–29].

Our goal was to improve the understanding of whether access to women doctors can improve health service uptake in the Indian context. To this end, we examined the association between women physician availability and RMCH indicators in India, adjusted for urbanicity, socioeconomic status and women’s higher education using data from two national surveys.

1. As per the recommendations of the Indian Public Health Standards, each primary health center (PHC) is to be staffed by a medical officer with recommendation of 2 additional medical officers, one of which will be female. The medical officer is responsible in her/his individual capacity and overall in-charge. She/he will be solely responsible for the proper functioning of the PHC, and activities related to national health programs. Responsibilities include curative work (including attending to cases and making arrangements for work distribution), preventive and promotion work (developing operational plans and effective implementation of national health programs), training of staff and administrative activities like maintaining records and logistics at the facility.

2. The nomenclature of LMO refers to women doctors in their professional position in public health systems in India, even as it is increasingly waning in use and is considered antiquated. The origins of this nomenclature can be traced to historical accounts referring to segregated health services for women in pre-independence India, establishment of the Association of Medical Women in India and the first medical college allowing women in 1875.
in India. DLHS is a periodic survey that collects data on the Reproductive and Child Health program in India, conducted by the International Institute for Population Sciences (IIPS) and the MoHFW, Government of India [31]. In this study, we used DLHS-4 data [32] from 18 states where facility assessment was conducted. DLHS – 4 states included Andhra Pradesh, Arunachal Pradesh, Goa, Haryana, Himachal, Karnataka, Kerala, Maharashtra, Manipur, Meghalaya, Mizoram, Nagaland, Punjab, Sikkim, Tamil Nadu, Telangana, Tripura and West Bengal that had not participated in Government of India’s Annual Health Surveys (AHS).

The final study sample of this study included all 256 districts (n = 256) in 18 states. Both these datasets were available open-access and accessed through the websites of the National Rural Health Mission [33] and the IIPS respectively. We utilized district factsheets using indicators for RMCH outcomes and measures of physician and health worker availability in primary care derived by the IIPS and Government of India. Derived indicators were based on appropriate sample weights, with strategies devised for minimizing non-sampling error and for data quality; details can be obtained from study reports.

While India’s health system is multi-layered, our measures and analyses focused on districts, and inferences are limited to district and state levels only. Women doctors are deputed as medical officers in primary health centers (PHCs) focused on rural populations, even as in recent years, PHCs have been introduced in urban settings per the National Urban Health Mission (NUHM, 2014) under the joint National Health Mission [34]. Each PHC comprises 4 – 6 sub-centers that are run by health workers and form the point of contact and referral between the community and the health system. For robustness, we conducted sensitivity analyses on rural populations and adjusted for urbanicity as a covariate, even as no differences were expected in overall versus rural estimates.

2.2. Measures

2.2.1. Dependent variables

We used a continuum of care approach examining six key indicators (or measures) of RMCH (measured as district percent) through pre-conception to post-delivery child care [35]. These indicators are central to India’s health programs as well as have significance for achieving global health goals. These include modern contraceptive use (indicator: any modern method of family planning among currently married women ages 15 – 49 years (%) ), 4+ antenatal care (ANC) visits (indicator: mothers who had at least 4 ANC visits (%) for last birth in the five years before the survey) [36], skilled birth attendance (indicator: births assisted by a doctor/nurse/lady health visitor (LHV)/auxiliary nurse midwife (ANM)/other health personnel (%) for all births in the last five years before the survey), postnatal care (PNC) for the mother (indicator: mothers who received PNC from a doctor/nurse/LHV/ANM/midwife/other health personnel within 2 days of delivery (%)), child immunization (indicator: children age 12–23 months fully immunized (Bacillus Calmette Guerin (BCG), measles and 3 doses each of polio and Diphtheria Pertussis and Tetanus (DPT) (%) vaccines), and postnatal care for the child (indicator: children who received a health check after birth from a doctor/nurse/LHV/ANM/midwife/other health personnel within 2 days of birth for last birth in the 5 years before the survey (%)). These RMCH indicators represent a breadth of services being delivered by a PHC, in rural settings, and the functions of the medical officer (man or woman) includes RMCH service delivery and monitoring/supervision of standards.

2.2.2. Independent variables

Our independent variable of interest was the district percent (%) of PHCs having a lady medical officer (LMO) available in the DLHS 4. We used this measure as a continuous variable in the main analysis. For bivariate analyses including t-tests for mean differences in outcomes and chi-square tests for differences between districts below and above median values of the health indicators, we categorized LMO availability as binary comparing districts with less than 50% of PHCs having LMOs (reference) versus with districts with PHCs having more than or equal to 50%. Districts with more than half the PHCs having an in-place LMO may be indicative of a more supportive district environment for women physicians.

2.2.3. Covariates

We adjusted for six district-level covariates. These included three covariates from the NFHS data including percent of households with an improved drinking-water source (%), percent of households with any usual member covered by a health scheme or health insurance (%) and percent of women with 10 or more years of schooling (%) in the district. These represented diverse markers of district socioeconomic status (water source and health scheme coverage) and of the status of women (women’s higher education). Additionally, from the DLHS data, we used and adjusted for availability of male health worker at the sub-center (%), which represents a cadre of health worker delivering basic health and family planning services and the sampled number of PHCs in the district to indicate district size. These were 15 on average (with interquartile range between 9 and 21). Finally we included percent urban population in the district as a covariate from district factsheets available from the NRHM – Health Management Information System (HMIS) website [33]. The measure of urbanicity may be a marker for better health systems or access to social and health services, and higher socioeconomic status of the district.

2.2.4. Analysis

We examined mean differences (along with t-tests) for all six outcomes – modern contraceptive use, 4+ ANC, skilled birth attendance, maternal PNC, infant PNC, and child immunization across districts with higher versus lower prevalence of PHC with LMOs (i.e., PHCs having LMOs < 50% versus districts with PHCs having LMOs > =50%; p-values reported). We also compared mean differences in key covariates by LMO distribution. We used multilevel regression models nesting districts in states to examine the association between LMO availability and the study outcomes, adjusted for drinking water access, health scheme coverage, percent of higher educated women, urbanicity, number of PHCs in the district and male health worker availability in the district. We compared multilevel models to ordinary least squares (OLS) regression models with robust standard errors and state fixed effects models for model specification, and multilevel models were preferred as they recognized the data structure of the surveys and provided more conservative confidence intervals. Additionally, we created binary measures of the outcomes classified by the number of districts below and above the median value of the measure, comparing against the binary measure of LMO. This was conducted as an exploratory analysis to examine whether districts with more than 50% of PHCs with LMO were significantly better than those less than 50% of PHCs with LMOs. Finally, for sensitivity analyses, we conducted primary multilevel analyses for rural populations only as PHCs and LMOs largely served rural areas until recently.

2.3. Funding

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3. Results

Overall, more than one in four districts (28.1%) had more than half of their PHCs staffed with at least one lady medical officer in 2012 – 13. Mean differences across districts with 50%+ LMOs compared to less than 50% LMOs showed higher maternal and child health care utilization outcomes for the former, with higher 4+ antenatal care visits (72.4% vs
Table 1a
Mean differences (t-test) for reproductive, maternal and child health (RMCH) indicators at the district level stratified by districts with Primary health Centers (PHCs) having lady medical officers (LMOs) >50% versus ≤ 50% for the overall and rural populations in the National Family Health Survey (NFHS)-District level Household Survey (DLHS) sample of 256 districts in 18 states in India.

|                  | Total Population |                          | Rural Population |                          |
|------------------|------------------|---------------------------|------------------|---------------------------|
|                  | Overall mean     | Districts with PHCs having LMO < 50% (n = 184) | Districts with PHCs having LMO > 50% (n = 72) | P                | Overall mean     | Districts with PHCs having LMO < 50% (n = 182) | Districts with PHCs having LMO > 50% (n = 67) | P                |
| Modern contraceptive use, any (%) | 49.9 (47.7,52.2) 51.1 (48.6,53.7) | 47.04 (42.4,51.7) | 0.1 | 50.1 (47.6,52.5) 51.3 (48.6,54.1) | 46.6 (41.4,51.8) | 0.08 |
| 4+ antenatal care (ANC) visits (%) | 65.6 (62.9,68.2) 62.9 (59.7,66.1) | 72.4 (68.1,76.6) | 0.0005 | 64.1 (61.2,66.9) 61.4 (57.9,64.9) | 71.3 (66.4,76.1) | 0.002 |
| Skilled birth attendance (%) | 85.1 (82.9,87.4) 82.5 (79.6,85.3) | 91.9 (89.0,94.9) | 0.0002 | 83.1 (80.6,85.7) 80.3 (77.1,83.4) | 90.9 (87.4,94.4) | 0.0002 |
| Maternal Postnatal care (PNC) (%) | 67.3 (64.7,69.8) 65.2 (62.1,68.3) | 72.6 (68.7,76.6) | 0.008 | 65.5 (62.8,68.2) 63.4 (60.0,66.7) | 71.4 (67.0,75.8) | 0.009 |
| Full immunization of children 12–23 months (%) | 65.4 (63.1,67.8) 63.7 (60.9,66.5) | 69.7 (65.3,74.1) | 0.02 | 64.4 (61.6,67.3) 63.3 (59.8,66.7) | 67.7 (61.7,73.6) | 0.1 |
| Infant Postnatal care (PNC) (%) | 26.3 (24.4,28.1) 25.5 (23.3,27.6) | 28.3 (24.5,32.1) | 0.1 | 26.9 (24.9,28.9) 26.3 (23.9,28.6) | 28.8 (24.6,32.9) | 0.2 |

Bold for p-values < 0.05.

62.9%, p = 0.001, skilled birth attendance (91.9% vs 82.5%, p = 0.0002), postnatal care for women (72.6% vs 65.2%, p = 0.008) and full immunization of children 12–23 months old (69.7% vs 63.7%, p = 0.002), but not for modern contraceptive use and PNC for children (Table 1a). Sensitivity analyses comparing the same outcomes for rural populations only showed similar patterns for 4+ ANC visits (71.3% vs 61.4%, p = 0.002), skilled birth attendance (90.5% vs 80.3%, p = 0.0002) and postnatal care for women (71.4% vs 63.4%, p = 0.009). However, our findings do not show differences in family planning and PNC for children with LMO availability among rural populations (Table 1a). Mean differences for covariates by LMO availability were also noted for health scheme coverage (42.7% vs 33.6%, p = 0.004), higher education of women (48.4% vs 39.5%, p = 0.001), urbanicity (38.1% vs. 26.2%, p = 0.001) and lower sub-center availability of male health workers (35.5 vs 46.7, p = 0.08) (Table 1b).

Multilevel regression models that assessed the adjusted associations between LMO availability and RMCH outcomes showed that LMO availability was associated with a 7% increase [β = 0.007 (95% CI: 0.008, 0.013)] in percent of 4+ ANC visits, along with increases in modern contraceptive use [β = 0.004 (0.0078, 0.008)], skilled birth attendance [β = 0.088 (95% CI: 0.03,0.14)] and in postnatal care for women [β = 0.076 (95% CI: 0.03,0.12)] (Table 2). Between and within state variation estimates showed variability in antenatal care, skilled birth attendance and maternal postnatal care at the state level and infant postnatal care within states. LMO availability was not associated with child immunization or PNC for the child. Among the covariates, higher education of women was associated with ANC visits, skilled birth attendance, PNC for the mother and child, and child immunization but not associated with contraceptive use. Urbanicity and health coverage were not associated with the outcomes. Multivariable analyses among rural populations only showed adjusted associations between LMO availability with modern contraceptive use [β = 0.049 (0.006, 0.09)], 4+ ANC visits [β = 0.058 (0.002, 0.11)], skilled birth attendance [β = 0.09 (95% CI: 0.02, 0.15)] and postnatal care for the mother [β = 0.07 (95% 0.02, 0.12), but not other outcomes (Supplementary Table 1).

4. Discussion

Findings from this study in India showed that districts with higher women physician availability in rural primary care reported higher reproductive and maternal health care utilization (e.g., modern contraceptive use, antenatal care, skilled birth attendance and maternal postnatal care). No significant associations were seen between women physician availability and child health care utilization. Estimates were adjusted for markers of district affluence - urbanicity, socioeconomic status of households and women's higher education, and for the number of PHCs in the district, for robustness. Findings from this study reiterate the need to understand gender-related influencers of health service uptake. Cross-contextual validation of the main finding from this study of the effects of women physician availability on women's own health seeking but not for child health indicators (infant PNC and child immunization) is needed. The latter may be attributed to prioritization of healthcare of children, where mothers or families are open to approaching doctors at primary care centers irrespective of their gender. Limited empirical evidence exists on this divergence in findings for women and children and further research using a gendered lens is needed to understand patient-provider interactions and preferences in India.

An alternate explanation for the observed findings as relates to maternal health may be that a PHC staffed with a woman doctor may be reflective of other district-level social indicators which simultaneously facilitate women physician employment and maternal health care utilization. These may include a more progressive social environment for women, higher safety and better infrastructure, or better schooling, childcare and other social services. Lack of individual level data on contextual, environmental and infrastructure variables impedes our ability to consider these factors. It may also be argued...
that facilities with more women physicians may create an environment more tailored to women’s needs, emphasizing the role of women doctors as role models and leaders in rural communities, and not only health providers. More research, qualitative and quantitative, is needed to explore these issues.

The mechanisms linking higher women physician availability to improved reproductive and maternal health utilization need exploration. Some evidence [27] is available through qualitative accounts in India [20]. But positions have been difficult to fill and have not included work from South Asia, and this study adds to the literature on gender-related abuse faced by women doctors. Other contexts have shown that women in the medical profession have shown greater consideration for balancing work with other responsibilities while making specialty choices, leading to their over-representation in some specialties (pediatrics, dermatology, psychiatry) and under-representation in surgical branches (with the exception of obstetrics and gynecology) [46–48]. Gender wage gaps in the medical profession also need investigation [49], as a recent ILO report showed that women are paid 34% less than men in India [50–53]. Research among doctors in India has also indicated greater family pressures on women, with disproportionate burdens of home/family/care responsibilities along with the pressures of medical practice [52]. Risks of workplace violence and sexual harassment for women doctors in India are inadequately understood [54–56], with global evidence showing gender-related abuse faced by women doctors within training as well as practice [46]. One small study from Indian hospitals showed high rates of verbal harassment (41%), psychological harassment (45%), sexual gestures and exposure (15%) and unwanted touch (27%) among hospital staff, including women doctors [55]. Economic incentives to doctors to serve in underserved areas [57–60] have been considered without recognizing systemic and social challenges faced by women doctors. Interventions such as flexible hours, part-time work, childcare support, family leave protections, mentorship and training for career development have been effective in other contexts [15,61] but need systematic examination in India. The risk of basing policies and standards on tokenism or ‘add women and stir’ approaches [62] rather than transformational approaches needs reflection.

In our study, availability of male health workers, a cadre of salary-fried front-line workers providing outreach and health education, was considered without recognizing systemic and social challenges faced by women doctors. Other contexts have shown that women in the medical profession have shown greater consideration for balancing work with other responsibilities while making specialty choices, leading to their over-representation in some specialties (pediatrics, dermatology, psychiatry) and under-representation in surgical branches (with the exception of obstetrics and gynecology) [46–48]. Gender wage gaps in the medical profession also need investigation [49], as a recent ILO report showed that women are paid 34% less than men in India [50–53]. Research among doctors in India has also indicated greater family pressures on women, with disproportionate burdens of home/family/care responsibilities along with the pressures of medical practice [52]. Risks of workplace violence and sexual harassment for women doctors in India are inadequately understood [54–56], with global evidence showing gender-related abuse faced by women doctors within training as well as practice [46]. One small study from Indian hospitals showed high rates of verbal harassment (41%), psychological harassment (45%), sexual gestures and exposure (15%) and unwanted touch (27%) among hospital staff, including women doctors [55]. Economic incentives to doctors to serve in underserved areas [57–60] have been considered without recognizing systemic and social challenges faced by women doctors. Interventions such as flexible hours, part-time work, childcare support, family leave protections, mentorship and training for career development have been effective in other contexts [15,61] but need systematic examination in India. The risk of basing policies and standards on tokenism or ‘add women and stir’ approaches [62] rather than transformational approaches needs reflection.

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even declined in recent years [63]. Male health workers can be important for rural health outreach in low resource settings. However, their role needs greater defining as guidelines indicate their responsibilities to include delivery of disease control programs, epidemic management, first-aid emergencies, sanitation and control of lifestyle diseases along with logistics management at health centers and facilitating the work of ANMs in family welfare and related activities. Women seeking care may be less responsive to male health workers, diminishing their value for maternal and child health care and this cadre may be better suited to build health awareness among families, particularly engaging male patient populations in reproductive health and family planning, given indications of low and delayed health care utilization among men in India [63].

Study limitations include reliance on self-report measures and cross-sectional analyses that preclude assumptions of causality. While data on women physician availability from the DLHS predates data on RMCH indicators from the NFHS, we do not infer causality. Further, reliance on ecological data at the district level only allow us to make inferences at the district level; concerns of ecological fallacy (e.g., these associations may not be inferred for individuals) may apply. Vacancies in India’s health staffing have remained a challenge. This analysis is based on data from 18 Indian states, and necessarily excluded states not sampled by the DLHS such as Bihar and Uttar Pradesh with low rates of health care utilization. Hence, findings may not be generalizable to India as a whole. Future national surveys inclusive of physician data may be able to provide greater insight into these issues at a national level. Finally, we focused our analysis on availability and are unable to provide insight into the technical expertise, experience, performance, motivation or qualitative characteristics of women physicians who were sampled in this study.

Even as less than one third of districts report more than half of PHCs having women doctors, availability of those doctors was associated with higher uptake of maternal health services in India. Interventions to improve development and availability of women physicians are urgently needed and can lead to improved maternal health seeking among rural women while at the same time building a stronger and more inclusive physician workforce.

Declaration of Competing Interest

This work was supported by a grant from the Bill & Melinda Gates Foundation. YA is employed by the Bill & Melinda Gates Foundation and contributed in individual her capacity as a global and national expert on gender inequalities. Views expressed are those of the authors and are not necessarily those of any institutions.

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Supplementary materials

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