

Is Respectful Care Provided by Community Health Workers Associated With Infant Feeding Practices? A Cross Sectional Analysis From India

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Abstract

Objectives: Breastfeeding and complementary feeding practices in India do not meet recommendations. Community health care workers (CHWs) are often the primary source of information for pregnant and postpartum women about Infant and Young child Feeding (IYCF) practices. While existing research has evaluated the effectiveness of content and delivery of information through CHWs, little is known about the quality of the interpersonal communication (respectful care). We analyzed the effect of respectful interactions on recommended IYCF practices.

Methods: We use data from evaluation of an at-scale mHealth intervention in India that serves as a job aid to the CHWs (N=3,266 mothers of children <12m from 841 villages in 2 Indian states). The binary indicator variable for respectful care is constructed using a set of 7 questions related to trust, respect, friendliness during these interactions. The binary outcomes variables are exclusive breastfeeding, timely introduction of complimentary feeding, and minimum diet diversity for infants. We also explore if most of the pathway from respectful care to improved behaviors is through better recall of messages (mediation analysis). All models controlled for socio-economic-demographic characteristics and number of interactions with the CHW.

Results: About half of women reported positive, respectful interactions with CHWs. More respectful interactions were associated with better recall of appropriate health messages. More respectful interactions were associated with a greater likelihood of adopting all child feeding behaviors except timely initiation of breastfeeding. After including recall in the model, the effect of respectful interactions alone reduced.

Conclusions: Respectful care from CHWs appears to be significantly associated with some behaviors around infant feeding, with the primary pathway being through better recall of messages. Focusing on improving social and soft skills of CHWs that can translate into better CHW-beneficiary interactions can pay rich dividends.

Introduction

Community health workers (CHWs) play an essential role in many low and middle-income countries and are positioned at frontlines to provide maternal, newborn and child health services and promote health behaviors¹. Evidence from low-and-middle-income countries suggests that interventions delivered by at-scale CHW programs have shown improvement in maternal, neonatal and child health outcomes¹⁻⁵. A recent mixed-methods systematic review focused on effects of CHW programs on inequities from intervention coverage to behavioral and mortality outcomes across continuum of care suggests that in some contexts, interventions involving CHW home visits and community-based group interventions have had moderate success in reducing inequities in maternal and new-born health intervention coverage and behaviors⁶. Strengthening CHWs programs can leverage these successes and have been recognized as

essential to reach every community and household to achieving universal coverage of key community-based evidence-based interventions and health services by 2030¹.

India has a strong government-led national Community Health Worker (CHW) programs with three cadres of over 2 million all-female CHWs delivering services at the frontlines. Accredited Social Health Activists (ASHAs) under National Health Mission and the Anganwadi Workers (AWWs) under the Integrated Child Development Services (ICDS) generally work together to serve pregnant, lactating women, and infants at the village-level serving a catchment area of 800–1000 individuals^{8,9}. Several studies from India have highlighted the positive role played by community health worker (CHW) programs on a range of reproductive, maternal and neonatal health including promotion of reproductive health and contraceptive services, birth preparedness, antenatal care during pregnancy, skilled birth attendance during delivery, facility delivery, and immunization coverage^{8,10–12}. Few studies have demonstrated usefulness of CHW interventions in bridging inequities in maternal and neonatal health behaviors (Blanchard 2019). For instance, a study in Bihar found that households belonging to a lower socio-economic status had greater higher odds of receiving food supplementation compared with households in the highest socio-economic status⁹. Another study from rural Uttar Pradesh found CHW's services for birth registration to be greater among women with higher socio-economic class and education compared to lower socio-economic class and education¹³. A review of interventions in India that promoted various parts of infant and young child feeding found that interventions that used community health workers to promote initiation of breastfeeding and feeding frequency were generally successful⁷.

The quality of CHW care provision is an important, yet understudied area of research. Some frameworks have considered factors that influence effectiveness of CHWs, including aspects of quality, but much of the focus has been on systems level factors^{14,15}. Less attention has been paid to what actually happens with the CHW is interacting with a community member, and how that interaction is associated with care. Respectful care, also called person-centered, interpersonal, woman-centered care, or described as part of the experience of care, is receiving increasing attention globally across the peripartum period as an important domain of quality. The WHO quality of care framework for maternal and newborn health specifically highlights experiences of care as a key component of quality². This domain of quality of care includes domains related to the interaction between the health care provider and the client (woman), including respect, communication, trust, etc.³ Respectful maternity care has been found to be associated with improved care seeking and health outcomes^{4,5} and respectful family planning care is associated with family planning knowledge, method uptake and continuation^{6,8}.

The majority of the research on respectful care has been about interactions that occur within health facilities, which mirrors the fact that most of this research has also been focused on the time around childbirth. There is a substantial body of literature documenting poor person-centered or disrespectful experiences that women face at the time of delivery. However, there is much less evidence about person-centered interactions between women and CHWs, even though, as discussed above, CHWs are often the

first and primary source of contact and information for many women globally throughout pregnancy and postpartum.

Few studies have specifically looked at respectful care and CHWs, despite the fact that part of the rationale for engaging community members to provide care was that they would have community trust, understand the cultural context, and be best able to communicate with community members⁹. Some studies of CHWs explore aspects of respectful care as one part of a broader focus on quality, for example, a qualitative study in Bangladesh about the quality of services by CHWs for malnutrition explored “acceptability” of the CHWs, found them acceptable and valuable to the community.¹⁰ Taking this one step further, little is known about how respectful (or disrespectful) care provided by CHW is associated with health outcomes. A study in which CHWs also providing family planning in India found that higher person-centered care was associated with method continuation⁸. A few studies have specifically looked at domains of respectful care and CHWs, most often trust. A qualitative study on CHWs in South Africa providing maternal and child health services found that lack of trust and concerns over confidentiality were barriers to care provision¹¹. Two qualitative studies from India exploring experiences of CHWs in strengthening maternal health services found that CHWs were unable to inspire trust and credibility in their communities, reasons for which were linked to limited community involvement in selection of CHWs and lack of timely receipt of payments linked to government conditional cash transfer programs^{16,17}.

India has 1.4 million Anganwadi workers (henceforth referred to as AWWs) who provide health and nutrition-related services. Anganwadi Workers work is based at Anganwadi Centres, early childhood development and feeding centers at the village-level that caters to a catchment area of 800–1000 individuals. Specifically, AWWs deliver five essential services for the nutrition program including supplementary food, home visits to inform pregnant and lactating women on pregnancy care and infant and young child feeding practices growth monitoring of children, pre-school education activities, and organize a monthly fixed-day event—village health and nutrition days (VHND) for immunization and other health-related services¹². AWWs are part-time female workers receiving an average monthly fixed honorarium of about USD 60 (INR 4500), although there is variation in honorarium across the country¹².

Based on the previous studies described above, we hypothesize that more respectful interactions between AWWs and pregnant and postpartum women will be associated with better adherence to the recommended child feeding guidelines, specifically through the pathway of improved knowledge of appropriate practices and health information (Fig. 1). Other factors unrelated to the person-centeredness of the interaction might both affect how a woman rates the person-centeredness of the interaction, and also her health behaviors, specifically the number of visits by the AWW. We hypothesize that a greater number of visits would increase both the PCC score and improve infant feeding behaviors. Individual woman and household characteristics will also need to be adjusted for as they might impact how information and the experience is translated in to feeding behaviors.

Data And Methods

Data

We use data from a more broader impact evaluation designed to test the effectiveness of a job aid, a mobile technology-based intervention for CHWs. The end-line survey was conducted by a survey team appointed by Network for Engineering and Economics Research and Management in 2019 across 12 districts in the two north Indian states of Madhya Pradesh (MP) and Bihar¹³. Using propensity score matching, 852 villages were selected from these 12 districts and then up to two AWCs/AWWs were sampled per village and up to eight mothers of children < 12m and up to three pregnant women in their last trimester were randomly sampled based on the AWW registries. All study participants provided verbal informed consent before data collection and were surveyed using structured computer-assisted personal interviews. Study protocols were reviewed and approved by institutional review boards at the University of California, Berkeley (Ref. No. 2016-08-9092), and the India-based Suraksha Independent Ethics Committee (Protocol No. 2016-08-9092).

Socio-demographics variables

We include the following socio-demographic variables in our models: age (continuous), years of education (continuous), women's work outside the home (yes/no), total number of pregnancies (continuous), caste (low caste (Scheduled caste or tribe) compared to higher caste/no caste), Religion (Hindu compared to other), and wealth (quartiles). We also include a variable for the state and arm of the intervention study.

Quality (respectful care)

To measure the interaction between AWWs and women, we measured seven questions related to the experience. Specifically, we asked if the woman felt that she could trust the AWW, the AWW had her best interest in mind, was interested in her health, treated her with respect, spent time with her, talked in a friendly manner, and that she felt comfortable asking the AWW questions. A binary variable was made for women who reported positively on all questions (1) compared to women who only reported positively on 6 or fewer (0).

Quantity

We include a variable for the woman receiving the adequate number of visits from the AWW based on her stage postpartum.

Knowledge

To measure knowledge, we include a variable indicating if a woman remember at least 50% of the messages that she was supposed to have been provided by the AWW, again, based on her specific point postpartum.

Primary Behavioural Outcomes

We explore the impact of quality of care on five infant feeding behavioural outcomes

1. Exclusive Breastfeeding: Proportion of women with infants 0–6 months old who report feeding their child only breastmilk in the last 24 hours
2. Breastfeeding initiation: Proportion of women with infants 0–12 months who reported feeding their infant within 1 hour of birth
3. Adequate diet: Proportion of infants who received an adequate diet as per their age in the last 24 hours.
4. Adequate number of meals: Proportion of infants 6–12 months who received the adequate number of meals in the last 24 hours.
5. Dietary Diversity: Proportion of infants 6–12 months who received at least 4 or more food groups in the last 24 hours.

First we describe the socio-demographics of our population, and women's interaction with the AWW, including the respectful care measures, using frequencies and means. We then show the proportion of women reporting each infant feeding behavioral outcome, by women who had a high and low respectful care score and look for differences by sub-group using chi squared tests. Next, we conduct a mediation analysis to understand if the pathway from respectful care to behavior change acts through knowledge. To do this, we first explore the association between respectful care and knowledge of health behaviors. Then, we run a series of 5 multi-variable logistic regression models exploring the association between respectful care and each of the 5 infant feeding behavioral outcomes, first with and then without knowledge, and adjusting for the other quality and socio-demographic variables. All models accounted for the survey study design and were clustered at the block level.

Results

Women in our sample were on average 24 years old, had 4.8 years of schooling, and were Hindu (92.3%) (Table 1). Almost a half (44.3%) were scheduled caste or tribe, and 17.3% were in paid work. About a third, 35.87%, received the adequate number of visits from the AWW, as defined by the government program based on their postpartum stage. About a quarter (23.5%) of women could remember at least 50% of the appropriate messages given their postpartum stage.

Overall, most women reported their interaction with AWWs highly, with 68–76% of women reporting positive answers for respectful care items (Table 2). Lowest ranking items were feeling that the AWW spent time at the visit (68%) and that they felt comfortable asking questions (69.8%). Highest ranking included feeling that the AWW treated them with respect (76.8%) and talked in a friendly manner (76.8%). Overall, just over half (54%) of women reported positive rankings for every single respectful care indicator.

Most (70.3%) of women with infants under 6 months fed their infants only breastmilk on the previous day, with significantly more women with a positive relationship with the AWW (76.6%) compared to those without (60%) reporting doing so (Table 3). Most (84.1%) of women with children 0–12 months breastfed

their infants within an hour of birth, again with significantly more women with positive relationships (85.1%) doing so compared to those without (82.4%). Less than half (43.3%) children 0–12 received an adequate diet in the last 24 hours based on their age, with more of those with a positive relationship with the AWW (47.5%) doing so compared to those without (37.3%). Just over half (58%) children 6–12 months received the adequate number of meals in the last 24 hours, with no significant difference by group. Finally, only 15% of children 6–12 months received 4 or more food groups the previous day, with significantly more with a positive relationship (16.7%) compared to those without (12%) doing so.

More respectful interactions are associated with increased recall of messages (OR = 2.49, 95% CI: 1.98–3.15) (Table 4). More respectful interactions are also associated with exclusive breastfeeding in the previous day (OR = 1.55, 95% CI: 1.22–1.98), but not breastfeeding initiation. After adding recall of messages to the model, more respectful interactions are still associated with exclusive breastfeeding, as is recall. Women’s education increases the likelihood of exclusive breastfeeding, and higher wealth decreases the likelihood of both breastfeeding behaviors. Receiving the adequate number of visits is associated with decreased likelihood of breastfeeding exclusivity, but increased likelihood of breastfeeding initiation.

Having a more respectful interaction with the AWW is associated with women being more likely to provide their infants adequate diet per their age, provide adequate number of meals and provide 4 or more food groups (OR = 1.34, 95% CI: 1.16–1.56; OR = 1.3, 95% CI: 1.01–1.67; OR = 1.55, 95% CI: 1.14–2.09, respectively) (Table 5). When we include recall in the model, we can see that most of the pathway between respectful interactions and behaviors is through improved recall of messages. Maternal education is associated with increased likelihood of adequate diet and frequency but not diversity and having the appropriate number of visits per postpartum stage is associated with decreased likelihood of these two behaviors.

Discussion

Women who have positive interactions with their community health workers, for example, who trust their CHW, feel respected, like they can ask questions, like the provider cares about them, are more likely to meet some components of appropriate child feeding practices that CHWs are aiming to improve. The primary pathway through which this acts is by increasing retention of knowledge (recall of messages). This suggests that supporting CHWs to be able to provide respectful care, which may include training and supportive supervision, but also potentially lower workload and more time to be able to spend with women, could help improve maternal behaviors and subsequent infant nutritional and growth outcomes.

Timely initiation of breastmilk is the only outcome explored that does not seem to be affected by the quality of respectful care. This could be because this practice is more deeply rooted in cultural practices and beliefs than the other health behaviors. Delayed introduction of breastmilk is practiced in some parts of India because of the belief that the mothers milk is not ready yet.^{18,19} Counselling that directly address some of these cultural beliefs may be necessary in addition to respectful care.

We hypothesized that number of times that a health care worker visits a woman could be an indicator of better quality, or at least influence women's perceptions of quality, and also, influence her recall of messages. Interestingly, while women receiving the adequate number of visits was associated with increased recall of messages, it was not consistently associated with appropriate behaviors, and in some cases, actually associated with women being less likely to practice those behaviors. It is possible that AWW visit women differentially—maybe focusing their efforts on women who they see being more in need of help, but who are less likely to practice certain behaviors. Regardless, understanding the relationship between number of visits and outcomes deserve more exploration.

We have evidence that respectful care matters for the translation of some CHW messaging into behavior change, and more research is needed to understand what other factors in combination with respectful care are most successful. Few interventions have specifically trained CHWs on domains related to respectful care. One study in Nepal providing training on interpersonal communication to CHWs providing family planning found evidence of improved communication, but that this was not the main barrier to women using family planning²⁰. Supportive supervision of CHWs has been found to help them gain confidence and subsequently better build trust with community members, but we do not know how this impacted health behaviors or outcomes⁹.

This study has several strengths, notably, its large sample size of randomly selected women and the collection of data on an understudied component of quality of CHW care— respectful care. However, there are several limitations. The first is that this is a cross-sectional study, so we are unable to make clear causal linkages. Despite the fact that the interaction with CHWs happened before the behavior, some types of women may be more likely to have or perceive positive interactions, and these women may also be more likely to adopt health behaviors. Given the retrospective nature of the data, there may be some recall bias, although women were asked questions relevant to their specific stage postpartum, so this should be minimal. Finally, we were unable to objectively measure other components of quality related to the interaction (for example, what messages the CHW actually told the woman) or have an objective measure of respectful care. However, the woman's experience of the interaction is probably a more meaningful measure.

Conclusions

CHWs are the first point of contact and main source of information for many people in LMICs, especially pregnant and postpartum women, living in rural areas who are disadvantaged in other ways. CHWs serving pregnant and postpartum women in India appear to overall provide care that is respectful, caring, and that women feel positively about, and, importantly, this is associated with uptake of appropriate health behaviors. However, CHWs often face many challenges, such as lack of support, resources, training, little or no pay, etc. Strengthening CHWs ability to provide respectful care could help improve health knowledge and outcomes, and is an essential component of providing high quality care.

Declarations

Ethics approval and consent to participate: Study protocols were reviewed and approved by institutional review boards at the University of California, Berkeley (Ref. No. 2016-08-9092), and the India-based Suraksha Independent Ethics Committee (Protocol No. 2016-08-9092).

Consent for publication: Not applicable

Availability of data and material: As soon as the main impact paper is published from this study, all data will be made available. It can be provided on request until that time.

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Authors' contributions:

NDS lead the analysis and manuscript preparation

LG supported the analysis plan and contributed to writing the methods and introduction

DW co-lead the design of the study, provided insight into the analysis and read and provided feedback on the manuscript.

LF co-lead the design of the study, and read and provided feedback on the manuscript.

PM co-lead the design of the study, and read and provided feedback on the manuscript.

SP provided guidance on the analysis plan, oversaw the direction of the manuscript, and read the final draft of the paper.

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Tables

Table 1
Socio-demographics of the study population

	N	%
Age (mean, IQR)	24.23	21–26
Number of pregnancies (mean, IQR)	2.6	1–3
Education in years (mean, IQR)	4.8	0–9
Paid Work	1,564	17.3
Scheduled Caste or Tribe	4,006	44.3
Hindu	8,366	92.3
Recalls at least 50% of messages	1,559	23.5%
State		
Bihar	4,767	52.8
Madhya Pradesh	4,266	47.2
Received adequate number of visits from AWW	2,380	35.87

Table 2
Components of respectful interaction between women and AWWs

	No.	%
Felt like you could trust the AWW		
No	1,357	23.9
Yes	4,322	76.1
Felt that the AWW had your best interest in mind		
No	1,532	27
Yes	4,147	73
Felt the AWW was interested in your health		
No	1,532	27
Yes	4,147	73
Felt the AWW treated you with respect		
No	1,320	23.2
Yes	4,359	76.8
Felt the AWW spent time at your visit		
No	1,820	32
Yes	3,859	68
Felt the AWW talked in a friendly manner		
No	1,319	23.2
Yes	4,360	76.8
Felt comfortable asking the AWW questions		
No	1,714	30.2
Yes	3,965	69.8
Binary Summary Score: 1 = positive on all indicators, 0 = positive on 6 or less		
Not positive	2,612	46
Positive	3,067	54
Total	5,679	100

Table 3
Bivariate association between child feeding indicators and respectful care (binary)

	Low respectful care		High respectful care		Total	
	No.	%	No.	%	No.	%
% infants 0-<6m of age who received only breastmilk during the previous day***						
0	267	40	257	23.4	524	29.7
1	400	60	841	76.6	1,241	70.3
Total	667	100	1,098	100	1,765	100
% beneficiaries with 0-12m child who breastfed their child within an hour of birth*						
0	217	17.6	306	14.9	523	15.9
1	1,015	82.4	1,743	85.1	2,758	84.1
Total	1,232	100	2,049	100	3,281	100
Children aged 0-12m who received adequate diet as per their age in last 24 hours***						
0	773	62.7	1,076	52.5	1,849	56.4
1	459	37.3	973	47.5	1,432	43.6
Total	1,232	100	2,049	100	3,281	100
Children aged 6–12 months who received adequate number of meals in last 24 hours						
0	254	45	382	40.2	636	42
1	311	55	569	59.8	880	58
Total	565	100	951	100	1,516	100
Children 6–12 months received 4 or more food groups*						
0	497	88	792	83.3	1,289	85
1	68	12	159	16.7	227	15
Total	565	100	951	100	1,516	100

*<0.5, **<0.01, ***<0.000

Table 4

Association between respectful care, knowledge recall and breast feeding practices, multivariable logistic regression models

	Recall 50% of messages	Only breastmilk last 24 hours	Only breastmilk last 24 hours	Breastfed within 1 hour of birth	Breastfed within 1 hour of birth
Population	Children 0–12 months	Children < 6 months	Children < 6 months	Children 0– 12 months	Children 0– 12 months
More respectful interaction with AWW (binary)	2.49***	1.55***	1.40***	1.12	1.02
	(1.98– 3.15)	(1.22–1.98)	(1.09–1.79)	(0.87–1.44)	(0.79–1.32)
Recall 50% of messages			1.60***		1.58***
			(1.22–2.08)		(1.29–1.94)
Woman's age (in years)	1.00	0.99	0.99	0.99	0.99
	(0.98– 1.02)	(0.95–1.03)	(0.95–1.04)	(0.96–1.03)	(0.96–1.03)
Woman's education (in years)	1.02**	1.04**	1.04**	1.01	1.01
	(1.00– 1.04)	(1.01–1.07)	(1.01–1.07)	(0.99–1.04)	(0.98–1.04)
Woman working outside the house (compared to not)	1.12	0.88	0.87	0.67***	0.66***
	(0.89– 1.39)	(0.59–1.29)	(0.58–1.30)	(0.51–0.89)	(0.50–0.87)
Parity	1.02	0.99	0.99	1.09	1.08
	(0.96– 1.07)	(0.90–1.09)	(0.90–1.09)	(0.97–1.21)	(0.97–1.21)
Scheduled Caste or Tribe (compared to no caste)	0.74***	1.25*	1.30**	0.92	0.95
	(0.63– 0.88)	(0.99–1.57)	(1.03–1.64)	(0.70–1.22)	(0.72–1.25)

*** p < 0.01, ** p < 0.05, * p < 0.1

Robust confidence interval in parentheses

	Recall 50% of messages	Only breastmilk last 24 hours	Only breastmilk last 24 hours	Breastfed within 1 hour of birth	Breastfed within 1 hour of birth
Hindu (compared to not Hindu)	1.25	1.45*	1.40	1.40	1.37
	(0.87–1.79)	(0.93–2.24)	(0.91–2.16)	(0.86–2.27)	(0.84–2.22)
Wealth quartile	1.08*	0.88*	0.87**	0.86***	0.85***
	(1.00–1.17)	(0.77–1.01)	(0.76–0.99)	(0.78–0.95)	(0.77–0.94)
Received adequate number of visits	1.50***	0.46***	0.43***	1.39***	1.33***
	(1.26–1.78)	(0.32–0.66)	(0.30–0.61)	(1.17–1.66)	(1.12–1.59)
State	1.04***	1.17***	1.17***	1.03***	1.03**
	(1.02–1.05)	(1.15–1.20)	(1.14–1.19)	(1.01–1.06)	(1.01–1.06)
Treatment Arm	1.60***	1.19	1.12	1.02	0.97
	(1.34–1.92)	(0.92–1.54)	(0.85–1.47)	(0.78–1.33)	(0.74–1.27)
Control	0.08***	0.13***	0.14***	2.38*	2.48*
	(0.04–0.16)	(0.05–0.35)	(0.05–0.35)	(0.92–6.13)	(0.96–6.42)
N	3,266	1,753	1,753	3,266	3,266
*** p < 0.01, ** p < 0.05, * p < 0.1					
Robust confidence interval in parentheses					

Table 5

Association between respectful care, knowledge recall and child feeding practices, multivariable logistic regression models

	Received adequate diet as per age in last 24 hours	Received adequate diet as per age in last 24 hours	Received adequate number of meals in last 24 hours	Received adequate number of meals in last 24 hours	Received 4 or more food groups	Received 4 or more food groups
Population	Children 0–12 months	Children 0–12 months	Children 6–12 months	Children 6–12 months	Children 6–12 months	Children 6–12 months
More respectful interaction with AWW (binary)	1.34***	1.14*	1.30**	1.25*	1.55***	1.26
	(1.16–1.56)	(0.98–1.33)	(1.01–1.67)	(0.96–1.62)	(1.14–2.09)	(0.89–1.77)
Recall 50% of messages		2.38***		1.25*		2.42***
		(2.07–2.75)		(1.00–1.57)		(1.58–3.69)
Woman's age (in years)	0.98*	0.98*	1.03	1.03	1.01	1.01
	(0.95–1.00)	(0.95–1.00)	(0.99–1.06)	(0.99–1.06)	(0.97–1.05)	(0.96–1.05)
Woman's education (in years)	1.03***	1.03***	1.05***	1.05***	1.02	1.02
	(1.01–1.05)	(1.01–1.05)	(1.02–1.08)	(1.02–1.08)	(0.98–1.06)	(0.98–1.06)
Woman working outside the house (compared to not)	0.90	0.88	1.33	1.32	1.18	1.13
	(0.74–1.11)	(0.72–1.08)	(0.93–1.90)	(0.92–1.89)	(0.75–1.87)	(0.74–1.73)
Parity	1.04	1.04	0.97	0.97	0.95	0.95

*** p < 0.01, ** p < 0.05, * p < 0.1

Robust confidence interval in parentheses

	Received adequate diet as per age in last 24 hours	Received adequate diet as per age in last 24 hours	Received adequate number of meals in last 24 hours	Received adequate number of meals in last 24 hours	Received 4 or more food groups	Received 4 or more food groups
	(0.98–1.12)	(0.97–1.11)	(0.90–1.04)	(0.90–1.04)	(0.84–1.08)	(0.83–1.08)
Scheduled Caste or Tribe (compared to no caste)	1.04	1.11	1.23*	1.25*	0.70**	0.73*
	(0.88–1.24)	(0.92–1.34)	(0.97–1.57)	(0.98–1.59)	(0.51–0.96)	(0.52–1.01)
Hindu (compared to not Hindu)	1.27	1.23	1.33	1.33	0.62*	0.60*
	(0.89–1.81)	(0.90–1.68)	(0.89–1.98)	(0.90–1.98)	(0.36–1.07)	(0.35–1.04)
Wealth quartile	0.96	0.95	1.12**	1.12**	1.13	1.14
	(0.89–1.05)	(0.87–1.03)	(1.00–1.25)	(1.00–1.25)	(0.96–1.34)	(0.96–1.35)
Received adequate number of visits	0.30***	0.26***	0.54***	0.51***	1.32	1.10
	(0.24–0.36)	(0.22–0.31)	(0.40–0.73)	(0.38–0.70)	(0.86–2.04)	(0.71–1.70)
State	1.10***	1.09***	0.97*	0.97*	0.95***	0.95***
	(1.08–1.12)	(1.08–1.11)	(0.95–1.00)	(0.95–1.00)	(0.92–0.98)	(0.92–0.98)
Treatment Arm	1.20	1.10	0.94	0.92	1.26	1.17
	(0.95–1.52)	(0.86–1.40)	(0.67–1.31)	(0.66–1.28)	(0.89–1.80)	(0.81–1.69)
Control	0.27***	0.28***	0.74	0.74	0.21***	0.22***

*** p < 0.01, ** p < 0.05, * p < 0.1

Robust confidence interval in parentheses

	Received adequate diet as per age in last 24 hours	Received adequate diet as per age in last 24 hours	Received adequate number of meals in last 24 hours	Received adequate number of meals in last 24 hours	Received 4 or more food groups	Received 4 or more food groups
	(0.13–0.55)	(0.14–0.57)	(0.23–2.32)	(0.24–2.34)	(0.07–0.64)	(0.07–0.69)
N	3,266	3,266	1,513	1,513	1,513	1,513
*** p < 0.01, ** p < 0.05, * p < 0.1						
Robust confidence interval in parentheses						

Figures

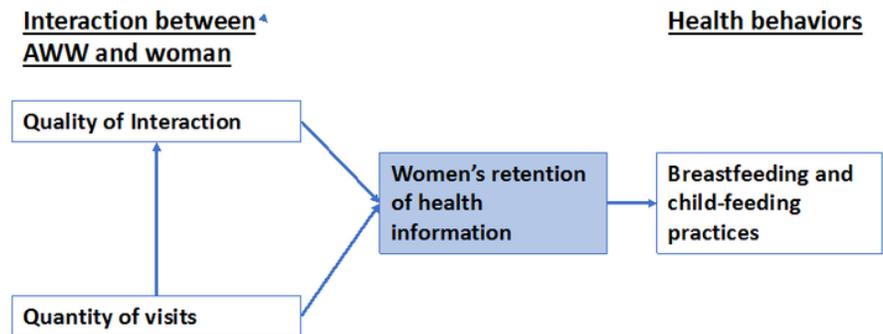


Figure 1

Conceptual and Analytical Model