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# The effect of report cards on the coverage of maternal and neonatal health care: a factorial, cluster-randomised controlled trial in Uttar Pradesh, India

Camilla Fabbri, Varun Dutt, Vasudha Shukla, Kultar Singh, Nehal Shah, Timothy Powell-Jackson



## Summary

**Background** Report cards are a prominent strategy to increase the ability of citizens to express their view, improve public accountability, and foster community participation in the provision of health services in low-income and middle-income countries. In India, social accountability interventions that incorporate report cards and community meetings have been implemented at scale, attracting considerable policy attention, but there is little evidence on their effectiveness in improving health. We aimed to evaluate the effect of report cards, which contain information on village-level indicators of maternal and neonatal health care, and participatory meetings targeted at health providers and community members (including local leaders) on the coverage of maternal and neonatal health care in Uttar Pradesh, India.

**Methods** We conducted a repeated cross-sectional, 2×2 factorial, cluster-randomised controlled trial, in which each cluster was a village (rural) or ward (urban). The clusters were randomly assigned to one of four groups: the provider group, in which we shared report cards and held participatory meetings with providers of maternal and neonatal health services; the community group, in which we shared report cards and held participatory meetings with community members (including local leaders); the providers and community group, in which report cards were targeted at both health providers and the community; and the control group, in which report cards were not shared with anyone. We generated these report cards by collating data from household surveys and shared the report cards with the recipients (as determined by their assigned groups) in participatory meetings. The primary outcome was the proportion of women who had at least four antenatal care visits (ie, attended a clinic or were visited at home by a health-care worker) during their last pregnancy. We measured outcomes with cross-sectional household surveys that were taken at baseline, at a first follow-up (after 8 months of the intervention), and at a second follow-up (21 months after the start of the intervention). Analyses were by intention to treat. This trial is registered with ISRCTN, number ISRCTN11070792.

**Findings** We surveyed eligible women for the baseline survey between Jan 13, and Feb 5, 2015. We then randomly assigned 44 clusters to the provider group, 45 clusters to the community group, 45 clusters to the provider and community group, and 44 clusters to the control group. Report cards of collated survey data were provided to recipient groups, as per their random allocation, in October, 2015, and in September, 2016. We ran the first follow-up survey between May 16 and June 10, 2016. We ran the second follow-up survey between June 18 and July 18, 2017. We measured the primary outcome in 3133 women (795 in the provider group, 781 in the community group, 798 in the provider and community group, and 759 in the control group) who gave birth during implementation of the intervention, between Feb 1, 2016, and July 18, 2017 (the end of the second follow-up survey). The report card intervention did not significantly affect the proportion of women who had at least four antenatal care visits (provider vs non-provider: odds ratio 0·85, 95% CI 0·65–1·13; community vs non-community: 0·86, 0·65–1·13).

**Interpretation** Maternal health report cards containing information on village performance, targeted at either the community or health providers, had no detectable effect on the coverage of maternal and neonatal health care. Future research should seek to understand how the content of information and the delivery of report cards affect the success of this type of social accountability intervention.

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## Introduction

India is the second largest contributor to the global burden of maternal deaths, accounting for 15% of all maternal deaths.<sup>1</sup> In Uttar Pradesh, India's most populous

state, maternal mortality remains high, at 201 deaths per 100 000 livebirths, and there are persistent gaps in the coverage of priority interventions for maternal and neonatal health.<sup>2,3</sup> There are known problems in the

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See [Comment](#) page e994

Department of Global Health and Development, London School of Hygiene & Tropical Medicine, London, UK (C Fabbri MSc, T Powell-Jackson PhD); and Sambodhi Research and Communications, Noida, Uttar Pradesh, India (V Dutt PGDip, V Shukla PhD, K Singh PGDip, N Shah MPH)

Correspondence to:

Dr Timothy Powell-Jackson, Department of Global Health and Development, London School of Hygiene & Tropical Medicine, London WC1H 9SH, UK  
[Timothy.Powell-Jackson@lshtm.ac.uk](mailto:Timothy.Powell-Jackson@lshtm.ac.uk)

**Research in context****Evidence before this study**

The effects of public reporting of the performance of health-care providers in high-income countries is summarised in several reviews. These reviews provide mixed evidence on whether provider report cards affect quality of care and health outcomes, and they offer no clear indication as to the types of health practitioners or the format of public reporting that are most likely to be effective. In low-income and middle-income countries, there is little evidence on the effectiveness of provider and community report cards in improving health. A review on provider report cards detailed the experiences of several countries in designing and implementing various forms of performance reporting systems, but none of the interventions were rigorously evaluated. We searched PubMed and Google Scholar for related studies that were published between Jan 1, 1990, and July 19, 2018, by use of the search terms “report cards”, “community-based monitoring”, and “provider scorecards”, and searches were restricted to reports published in English. We found no published trials that assessed the efficacy of report cards on improving health in developing countries, except for one study on report cards in Uganda that reported a reduction in under-5 mortality after report card use, which was also discussed in a systematic review on community accountability.

**Added value of this study**

To our knowledge, ours is one of few rigorous studies examining the effect of report cards on health in a low-income and middle-income country setting. The factorial design was motivated by a theory of change on how report cards might work—by leveraging providers’ prosocial motivation or by increasing public accountability and community participation—to improve coverage by maternal health services. Our findings suggest that both mechanisms failed to increase service coverage, which has broader implications for related policies in India and other countries.

**Implications of all the available evidence**

Report cards are a popular method to communicate information; however, they can take many different forms and it is important to understand whether the format and type of information provided affects the success of interventions. The process through which report cards are introduced, presented, and discussed, and who they are targeted towards are likely to affect the level of participation and engagement. Report cards are at the heart of public programmes that are being scaled up across India and our findings raise questions of the effectiveness of these large-scale strategies. Policy makers should carefully consider what our results mean for further roll-out of this approach in the country.

performance of the public sector in this region,<sup>4</sup> as reflected by a high prevalence of absenteeism of front-line health workers<sup>5</sup> and poor quality of care.<sup>6,7</sup>

In the past decade, policy makers have embraced the idea of social accountability to address the problem of poor service delivery. Many social accountability interventions include the provision of information on local services, typically in the form of report cards, and the facilitation of community meetings that bring together local leaders, health-care providers, and citizens to identify problems and develop plans of action.<sup>8–11</sup> It is argued that such interventions can give citizens a voice, empowering them to hold service providers and political institutions to account.<sup>11</sup> This approach has particular appeal in health because patients are often poorly informed about their entitlements and the quality of services available to them.<sup>12</sup>

In India, citizen report cards have been implemented at scale across much of the country, attracting considerable policy attention both domestically and internationally.<sup>11,13</sup> However, they are not specific to health services, nor have they been rigorously evaluated. The Community Action for Health programme, a key component of the Indian Government’s National Health Mission, is more relevant to our study. This programme places considerable emphasis on social accountability by use of village and facility report cards, strengthening village health, sanitation, and nutrition committees, and organising meetings by these committees in 25 states.<sup>14</sup>

In Uttar Pradesh, a World Bank-funded health systems strengthening project has also been supporting large-scale implementation of a social accountability report card intervention.<sup>15</sup>

Despite the enthusiasm for social accountability programmes, there is little evidence of their effectiveness in low-income and middle-income countries. A review<sup>16</sup> on provider-specific report cards detailed the experiences of several countries in designing and implementing various forms of performance reporting systems, but none of the interventions were rigorously evaluated. A 2012 review<sup>10</sup> on community accountability identified one study<sup>17</sup> on report cards, a highly cited randomised controlled trial in the primary health sector of Uganda that found a reduction in under-five mortality with this intervention. This finding, however, has not been replicated in a larger trial of a similar intervention in the same country.<sup>18</sup>

Our study examines the effect of report cards on the coverage of maternal and neonatal health care in Uttar Pradesh, India. We aimed to understand the effectiveness of this approach and the potential mechanisms by which these report cards might work by use of a factorial, cluster-randomised controlled trial, to test two variants of the intervention: report cards that targeted health providers and report cards that targeted community members. The community approach closely mirrored the government approach described in its Community Action for Health programme.

## Methods

### Study design

In this repeated cross-sectional, 2×2 factorial cluster-randomised controlled trial, we evaluated the effect of maternal health report cards on the coverage of maternal and neonatal health services. We tested two variants of the intervention: one targeting health providers and another targeting community members (including local leaders; panel). These groups were referred to as the recipients of the intervention. We defined a cluster as a village (rural) or a ward (urban) based on the Census of India 2011. Our study was nested within a larger study on social franchising, which meant that we worked in the same clusters as the broader research project. Details on the sampling strategy for cluster selection are published elsewhere.<sup>19</sup> Census of India 2011 data indicate that the clusters in our study were similar in sociodemographic characteristics to the districts and the state in which they are located (appendix p 18).

Uttar Pradesh is India's most populous state, comprising more than 200 million people living in 18 divisions and 75 districts. Maternal and infant mortality remain high in this state: estimates of the maternal mortality rate in 2014–16 found 201 deaths per 100 000 livebirths, and infant mortality was estimated to be 64 deaths per 1000 livebirths.<sup>2,3</sup> The study was done in six districts of Uttar Pradesh: Kannauj, Kanpur Nagar, Kanpur Dehat, Auraiya, Etawah, and Fatehpur. These districts vary only slightly in their demographic and health indicators, except for one outlier: Kanpur Nagar is predominantly urban, with higher literacy and lower mortality than the state average.<sup>2</sup> The other districts are more typical of the state: they are largely rural, and they have poor literacy and high rates of maternal and child mortality. The health system in the study districts is pluralistic, comprising a wide range of public and private providers. The private market for maternal health care in the study area largely consists of numerous small, individually owned hospitals and clinics.

Mothers who were interviewed for the purposes of data collection (ie, survey respondents) were asked to provide written informed consent. They were able to decline interviewing at any time. Some of the interviews involved women whose baby had recently died, and researchers were trained to deal with such cases sensitively. Written consent to conduct the study was obtained from the Pradhan of the Gram Panchayat or, if unavailable, an alternative community representative in each cluster. The study received ethical approval from the Indian Council of Medical Research (HMSC/2014/10/HSR), the Public Healthcare Society in India (10/Nov/2013), and the London School of Hygiene & Tropical Medicine (London, UK; 8610). This trial is registered with ISRCTN, number ISRCTN11070792.

### Randomisation and masking

We randomly assigned clusters, stratified by baseline coverage of antenatal care (three equally sized groups

representing tertiles of coverage: lowest, middle, and highest) and receipt of the social franchising intervention (two groups: receiving *vs* not receiving the intervention), to four groups (1:1:1:1). These groups were the provider group, in which we shared report cards and held participatory meetings with providers of maternal and neonatal health services; the community group, in which we shared report cards and held participatory meetings with community members (including local leaders); the providers and community group, in which report cards were targeted at both health providers and the community; and the control group, in which report cards were not shared with anyone. Clusters were randomly assigned to groups by TP-J with a computer random number generator and an algorithm in Stata (version 13) that ensured the proportion of clusters allocated to each of the four arms was the same within each stratum.

It was not possible to mask recipients of the intervention or beneficiaries to their group allocation. Fieldworkers who collected data were masked to the group allocations of the clusters, and they operated independently of the team who were involved in the delivery of the report card intervention. To address potential bias from respondents knowing their allocated group, the household survey was designed to validate responses with patient documentation (antenatal cards and birth certificates) when these were available.

### Cross-sectional household survey

The intended beneficiaries of the maternal health report cards were women of childbearing age and their infants, who lived in the intervention villages. These women could also actively participate in the community intervention group meetings.

We administered a household survey of eligible women (referred to as survey respondents, and who represented a sample of the intended beneficiaries) at three points in time. Data collected in the first and second round of the household survey were used to generate report cards as part of the intervention (panel). For the purposes of the evaluation, the first survey provided baseline data, whereas the subsequent two follow-up surveys were conducted after the intervention was initiated and were used to measure the effects of the report cards.

All women who had given birth in the previous 24 months were eligible to be surveyed at baseline. Women who had given birth in the previous 18 months were eligible respondents for the first follow-up survey round, and women who had given birth in the previous year were eligible respondents for the second follow-up survey round. At all rounds of data collection, women whose child was stillborn or had died since birth were eligible for inclusion. Women who were eligible for study inclusion were identified through a census of households in the study clusters, which was conducted 1 month before the beginning of each round of the household survey.

See Online for appendix

**Panel: Maternal health report cards****Overview**

Our intervention involved providing village-level information on the coverage of maternal and neonatal health services to health providers only, communities only, or both, by use of report cards and participatory meetings. In the health provider group, we targeted health providers that offered maternal and neonatal health services. In the community group, we targeted community leaders and beneficiaries. The report cards targeted at providers were hypothesised to work by leveraging providers' pro-social motivation to both stimulate demand for their services and to improve the quality of care they provided. If providers are pro-socially motivated, feedback could be delivered to them privately, with no need for public accountability to change their behaviour. The theory of change behind the community intervention was that the report cards would make community leaders more accountable to their citizens, thereby encouraging them to devise and implement strategies to improve the provision of and demand for maternal health services in the local area. Community participatory meetings thus sought to include local politicians and other community leaders, allowing women in the community to voice their concerns in the presence of those with the influence, authority, and resources to affect change. The community intervention group closely mirrored the Indian Government's approach laid out in its Community Action for Health programme (appendix pp 2–3). Our intervention was implemented by Sambodhi Research and Communication, an Indian research organisation with experience in designing, supporting, and implementing participatory approaches to improve community health. The intervention was developed as part of our study over a 4-month period, including intense piloting in two villages in the study districts.

**Feedback cycle**

We anticipated that providers and community stakeholders would change their behaviour in response to the information contained within the report cards and that, ultimately, coverage of maternal and neonatal health services would improve. We envisioned the report card intervention as a cycle, in which maternal and neonatal health services were provided to the community, performance was monitored through household surveys, a performance report card was fed back to the community or providers (or both) through participatory meetings, providers and community members would plan actions to improve performance, and the behaviour of providers and community stakeholders would then be altered by the information received, after which the cycle would return to the start. There were two feedback sessions during the study period; the first round was implemented in October, 2015 and the second in September, 2016.

**Content of report cards**

We designed a report card (appendix pp 4–5) to incorporate indicators of service coverage measured at the cluster (ie, urban ward or rural village) level. Data collected in the baseline and the

first follow-up of the household survey were used to produce two report cards that were delivered to recipients in two waves of feedback. The purpose of the report cards was to communicate information about maternal and newborn health indicators in villages in a way that was simple to comprehend for those with low literacy. The report card covered five indicators: four or more visits to antenatal care, antenatal counselling, facility births, immediate breastfeeding, and neonatal clean cord care. Indicators were colour-coded and were assigned an icon representing the specific health service that each of them measured. The coverage of each indicator was communicated on a scale from 0 to 10 (0–100% coverage). Report cards in the first wave of feedback were based on data collected in the baseline household survey, and they showed the coverage level in the cluster and the coverage of the best performing cluster in the same district. Those in the second wave of feedback were compiled with data from the first follow-up survey, such that communities and providers could be informed of changes over time that might be indicative of actions they undertook in the intervening period.

**Targeting health providers**

In this group, report cards were shared and participatory meetings were held with health providers, but this information was not shared with the wider community. The report card was shared and discussed with health providers that offered maternal health services. Eligible health providers included Accredited Social Health Activists (ASHAs); private and public providers; private Ayurveda, Yoga, Unani, Siddha, and Homoeopathy; and private doctors and private rural health practitioners who had been providing antenatal care services for at least 3 months before the intervention. ASHAs were included because they generate demand for services; they are an important link between providers and the community, even if they do not offer antenatal care themselves. Potential participants were identified through a health provider census and they were then screened for eligibility. All eligible providers were asked to participate, including a maximum of three private rural health practitioners. The information was communicated to providers individually by non-medical facilitators. An average of 3–6 meetings with the health providers were held in each cluster and, overall, 45% of participants were private providers, 10% were public providers, and 45% were ASHAs. The structure of meetings were that: first, the implementation team would provide an introduction to the project and present the report card; then there would be an interactive presentation to illustrate the five key indicators and coverage levels; and, finally, the provider would be engaged in a discussion of potential strategies to improve service coverage in their community in the following year. Report cards were left with the provider.

**Targeting the community**

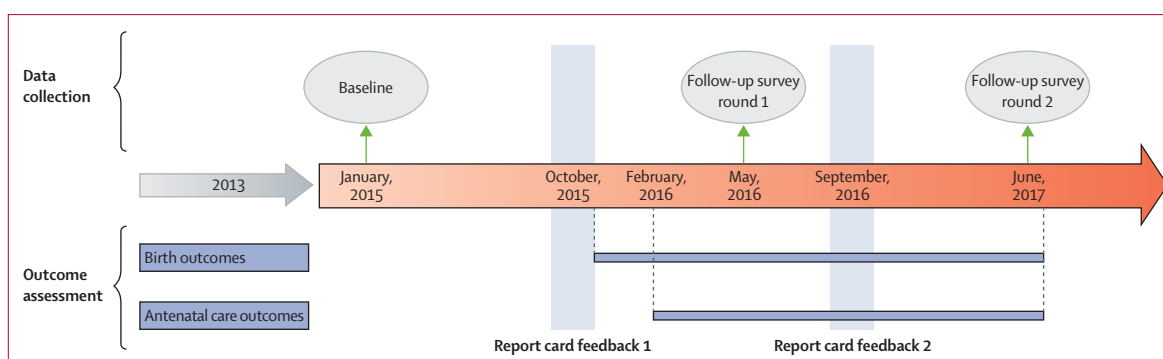
In this group, report cards were shared and participatory meetings were held with specific members of the community.

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(Panel continued from previous page)

The reporting of performance was made public during several organised meetings. Community members targeted included Panchayat members (local political representatives), teachers, ASHAs, Anganwadi workers, religious leaders, and female recipients and their husbands. The meetings were designed to be as inclusive as possible. The meetings were held in central locations in the village. For each feedback cycle, an average of 1.6 meetings were organised in each cluster with an average of 21 village members attending the meetings (1.0 Panchayat members, 0.6 teachers, 0.9 ASHAs, 0.8 Anganwadi workers,

0.1 religious leaders, 13.4 female recipients, and 3.5 partners). At least one Panchayat member was present at a meeting in 69 (77%) of the 90 clusters. Meetings started with an introduction of the report card; an interactive presentation would follow to describe the five indicators in more detail; and, finally, community members were encouraged to engage in a discussion around strategies to improve coverage over the following year. Poster-size report cards were displayed in prominent public places and report cards were left with community leaders at each participatory meeting.



**Figure 1: Study timeline**

The intervention effect was estimated with outcome data for births that occurred between the dates indicated by the blue lines. The two feedback periods were those in which the report cards were delivered to groups. Birth outcomes relate to care at childbirth; antenatal care outcomes relate to antenatal care.

Every member of the household was listed and, for women aged 15–49 years, a series of questions asked whether they had given birth to a baby that was born alive, stillborn, or miscarried before birth (but women were ineligible for interview if they miscarried). With this sampling frame, up to 30 eligible women in each cluster were selected for interview by the data manager in the Delhi office by use of a computer random number generator.

Each team of fieldworkers was managed by a supervisor. Data were collected electronically by the fieldworkers, who used automated checks to reduce erroneous entries. Every day, data were backed up and sent to the central office in Delhi, where they were further checked for consistency. Women who were selected for interview but could not be located while the survey team was in the cluster were revisited at the end of the survey round.

### Community and health provider meetings

Implementation data on who was present at meetings to present the report cards, their level of engagement, and the strategies discussed were systematically recorded and entered into a database.

### Outcomes

Outcomes were prespecified to include indicators of health-care use, quality of care, and healthy behaviours. The primary outcome, which was assessed in all rounds

of the survey, was the proportion of women who had at least four antenatal care visits (ie, attended a clinic or were visited by a health-care worker) during their last pregnancy, as recommended by the Indian Government<sup>20</sup> and reflected in the trial registration. The original study protocol, which was written before trial registration, stated that the primary outcome was three antenatal care visits, but this outcome was modified to four visits in the amended study protocol because the state government changed the recommended number of antenatal care visits during the study.

The secondary outcomes were the proportion of women who received counselling on three danger signs (vaginal bleeding, convulsions, and prolonged labour) during their pregnancy; who were fully immunised against tetanus; who were visited by a community health worker (referred to as an Accredited Social Health Activist [ASHA]) during pregnancy; and gave birth in a health-care facility; and the proportion of neonates who were immediately breastfed within 1 h of birth; who received clean cord care (ie, use of a clean instrument to cut the umbilical cord, a clean instrument to tie the cord, and had nothing put on their umbilical cord); and who were registered and received an official birth certificate. These outcomes were measured in all rounds of the survey. These outcomes were measured with established survey instruments that have been widely used in India and other low-income and middle-income countries. We

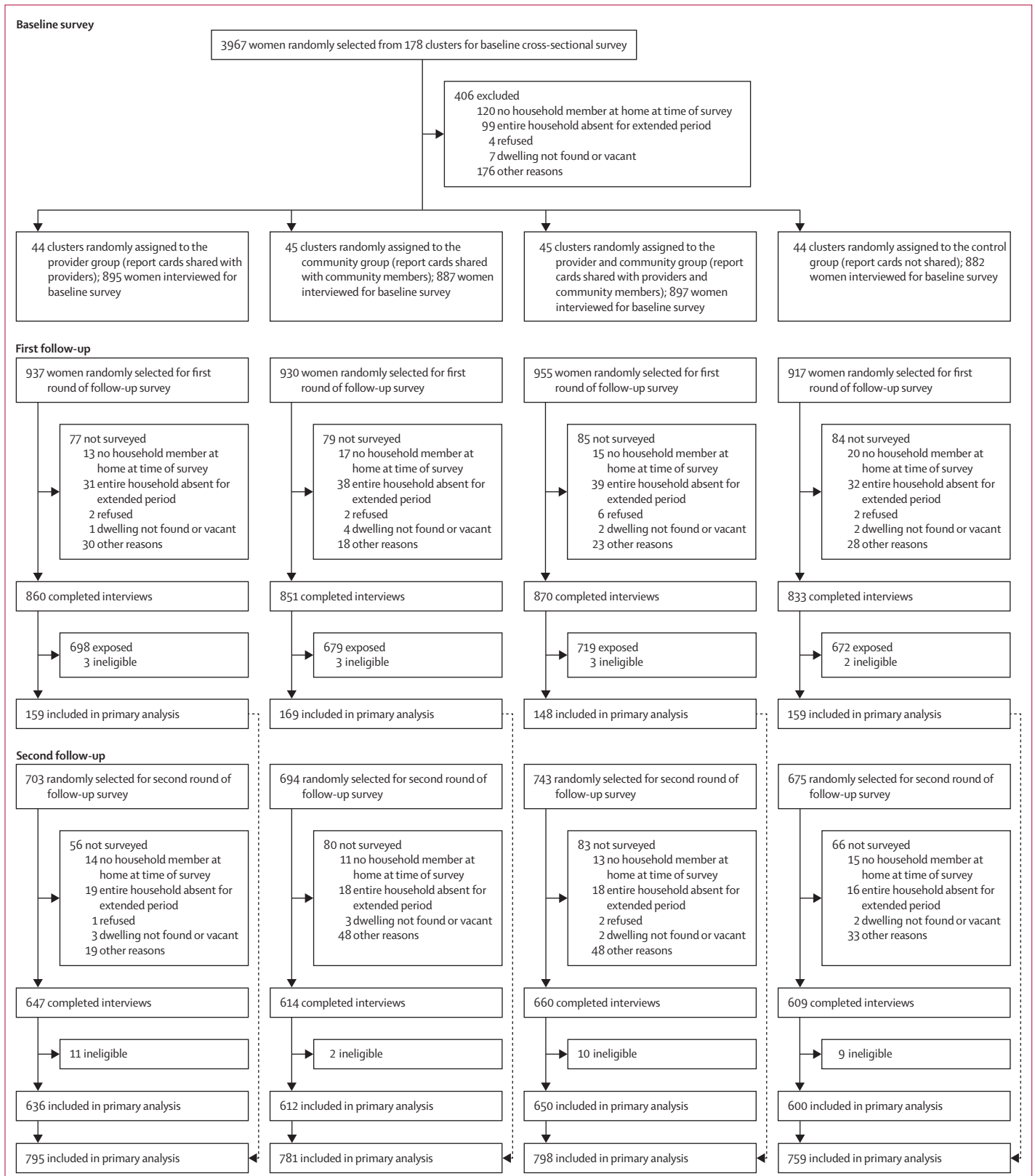


Figure 2: Trial profile

did not anticipate the intervention to have adverse effects at cluster or participant level.

### Statistical analysis

Sample size calculations were based on a 2×2 factorial design, to compare 90 clusters in which the report card was targeted at the community with 90 comparison clusters (ie, those in which the intervention was targeted at provider and control group clusters), and to also compare 90 clusters in which the report card was targeted at providers with 90 comparison clusters (ie, those in which the intervention was targeted at communities and control group clusters). Based on an observed prevalence of four or more antenatal care visits of 15% at baseline and an intraclass correlation coefficient (ICC) of 0·07, a sample size of 90 clusters per factorial arm with 25 women in each cluster was estimated to provide 80% power to detect a 5 percentage point increase in the incidence of four antenatal care visits at a 5% significance level.

Data on outcomes were generated by women in the household survey recalling past events during their pregnancy and childbirth. For the primary analysis, we pooled data from the first and second follow-up survey rounds. We excluded some women interviewed in the first follow-up, who we term unexposed, because they were pregnant before the report cards were implemented. For the four outcomes related to antenatal care, women who gave birth before Feb 1, 2016 (ie, who were more than 5 months pregnant when the intervention was first implemented) were defined as unexposed, and they were therefore excluded from the analytical sample (figure 1). For the four outcomes related to care at childbirth, women who gave birth before Nov 1, 2015, were defined as unexposed, and they were therefore excluded from the analytical sample. We examined the sensitivity of the results to variations in the birth date cutoff that we used to define the exposed sample.

Our primary analysis was based on a factorial design, comparing 89 clusters where the report cards were targeted at providers with 89 clusters where the report cards were not targeted at providers, and 90 clusters where the report cards were targeted at the community with 88 clusters where the report cards were not targeted at the community. Data were analysed at the individual level by intention to treat. For each binary outcome, we show the proportion of women with the outcome in each (2×2) group and the difference between groups as an odds ratio [OR] and marginal effect. We used a multilevel mixed effects logistic model that allows for random effects at the cluster level. In the unadjusted estimates, we controlled for the stratification variables. In the adjusted estimates, we also incorporated the cluster-level outcome at baseline. With the same multilevel mixed effects model, we prespecified a treatment group analysis, to investigate any interaction between the interventions. Each treatment group was inserted into the model as a

separate dummy variable, with the control group as the reference category. We made no adjustment for multiplicity of testing. All analyses were done with Stata (version 15).

### Role of the funding source

The funder of the study had no role in study design, data collection, data analysis, data interpretation, or writing of the report. The corresponding author had full access to all the data in the study and had final responsibility for the decision to submit for publication.

### Results

We ran our study in 178 clusters (villages or wards) in six districts of Uttar Pradesh, India. Between Jan 13, and Feb 5, 2015, we surveyed eligible women in the baseline survey. We then randomly assigned 44 clusters to the provider group, 45 clusters to the community group, 45 clusters to the provider and community group, and 44 clusters to the control group.

At baseline, we selected 3967 eligible women for interview, of whom 3561 (90%) women were surveyed (figure 2). We interviewed 3414 women (91% of 3739 women assessed) at the first follow-up (May 16–June 10, 2016) and 2530 women (90% of 2815 women assessed) in the second follow-up (June 18–July 18, 2017). The analytical sample for the outcomes related to antenatal care included 3133 women who gave birth between Feb 1, 2016, and July 18, 2017. The analytical sample for the outcomes related to care at childbirth included 3802 women who gave birth between Nov 1, 2015, and July 18, 2017. Report cards of collated survey data were provided to recipient groups in October, 2015, and in September, 2016.

The characteristics of women in the four treatment groups and in pairs of intervention groups at baseline are shown in table 1. Participants in the four groups were similar in age, caste, religion, and wealth. There were small differences in educational attainment and residence between groups. Across the groups, women also had similar maternal and neonatal health coverage indicators. For instance, at baseline, only 522 (15%) of 3518 women who were assessed attended four or more antenatal care visits and counselling on danger signs was poor (table 1). Although more than two-thirds of women assessed at baseline gave birth in a health facility, only 2000 (57%) of 3519 neonates were immediately breastfed, 1360 (39%) neonates received clean cord care, and 830 (24%) neonates received their birth certificate. The characteristics of women remained balanced across the four treatment groups in subsequent survey rounds (appendix pp 8–9).

No clusters were lost to follow-up. All clusters received the assigned treatment, except for one village in Kannauj: this cluster was randomly assigned to the community group but, during the second feedback cycle, facilitators erroneously conducted one feedback meeting with a health provider.



	Total	Intervention groups				Pairs of intervention groups			
		Provider	Community	Provider and community	Control	Provider (provider and both)	Community (community and both)	Non-provider (community and control)	Non-community (provider and control)
<b>Characteristics</b>									
Mean age of mother (SD)	26.18 (0.08)	26.24 (0.16)	25.98 (0.17)	26.18 (0.16)	26.34 (0.15)	26.21 (0.11)	26.08 (0.11)	26.16 (0.11)	26.29 (0.11)
Maternal education									
None	974 (28%)/3515	255 (29%)/879	239 (27%)/871	251 (28%)/889	229 (26%)/876	506 (29%)/1768	490 (28%)/1760	468 (27%)/1747	484 (28%)/1755
Primary	525 (15%)/3515	137 (16%)/879	113 (13%)/871	132 (15%)/889	143 (16%)/876	269 (15%)/1768	245 (14%)/1760	256 (15%)/1747	280 (16%)/1755
Secondary	1309 (37%)/3515	342 (39%)/879	330 (38%)/871	321 (36%)/889	316 (36%)/876	663 (38%)/1768	651 (37%)/1760	646 (37%)/1747	658 (37%)/1755
Higher	706 (20%)/3515	145 (16%)/879	189 (22%)/871	185 (21%)/889	187 (21%)/876	330 (19%)/1768	374 (21%)/1760	376 (22%)/1747	332 (19%)/1755
Caste									
Scheduled caste	1109 (32%)/3519	294 (33%)/880	271 (31%)/874	277 (31%)/889	267 (30%)/876	571 (32%)/1769	548 (31%)/1763	538 (31%)/1750	561 (32%)/1756
Scheduled tribe	105 (3%)/3519	24 (3%)/880	32 (4%)/874	14 (2%)/889	35 (4%)/876	38 (2%)/1769	46 (3%)/1763	67 (4%)/1750	59 (3%)/1756
Other backward caste	1618 (46%)/3519	400 (45%)/880	376 (43%)/874	421 (47%)/889	421 (48%)/876	821 (46%)/1769	797 (45%)/1763	797 (46%)/1750	821 (47%)/1756
General	687 (19%)/3519	162 (18%)/880	195 (22%)/874	177 (20%)/889	153 (17%)/876	339 (19%)/1769	372 (21%)/1763	348 (19%)/1750	315 (18%)/1756
Household has Below Poverty Line card	1328 (38%)/3519	330 (38%)/880	328 (38%)/874	333 (37%)/889	337 (38%)/876	663 (37%)/1769	661 (37%)/1763	665 (38%)/1750	667 (38%)/1756
Wealth quintile									
Poorest	1002 (28%)/3519	288 (33%)/880	239 (27%)/874	231 (26%)/889	244 (28%)/876	519 (29%)/1769	470 (27%)/1763	483 (28%)/1750	532 (30%)/1756
Second	802 (23%)/3519	190 (22%)/880	236 (27%)/874	195 (22%)/889	181 (21%)/876	385 (22%)/1769	431 (24%)/1763	417 (24%)/1750	371 (21%)/1756
Third	654 (19%)/3519	176 (20%)/880	158 (18%)/874	163 (18%)/889	157 (18%)/876	339 (19%)/1769	321 (18%)/1763	315 (18%)/1750	333 (19%)/1756
Fourth	549 (16%)/3519	129 (15%)/880	128 (15%)/874	158 (18%)/889	134 (15%)/876	287 (16%)/1769	286 (16%)/1763	262 (15%)/1750	263 (15%)/1756
Richest	512 (15%)/3519	97 (11%)/880	113 (13%)/874	142 (16%)/889	160 (18%)/876	239 (14%)/1769	255 (14%)/1763	273 (16%)/1750	257 (15%)/1756
Hindu	3122 (89%)/3519	784 (89%)/880	792 (91%)/874	787 (89%)/889	759 (87%)/876	1571 (89%)/1769	1579 (90%)/1763	1551 (89%)/1750	1543 (88%)/1756
Urban	394 (11%)/3519	56 (6%)/880	89 (10%)/874	126 (14%)/889	123 (14%)/876	182 (10%)/1769	215 (12%)/1763	212 (12%)/1750	179 (10%)/1756
<b>Outcomes</b>									
Four or more antenatal care visits	522 (15%)/3518	127 (14%)/880	136 (16%)/873	133 (15%)/889	126 (14%)/876	260 (15%)/1769	269 (15%)/1762	262 (15%)/1749	253 (14%)/1756
Counselling on all danger signs	378 (11%)/3519	99 (11%)/880	102 (12%)/874	79 (9%)/889	98 (11%)/876	178 (10%)/1769	181 (10%)/1763	200 (11%)/1750	197 (11%)/1756
Tetanus immunisation during antenatal care	2876 (82%)/3497	692 (79%)/877	723 (83%)/867	737 (83%)/884	724 (83%)/869	1429 (81%)/1761	1460 (83%)/1751	1447 (83%)/1736	1416 (81%)/1746
ASHA visit during antenatal care	2615 (74%)/3518	678 (77%)/880	645 (74%)/873	673 (76%)/889	619 (71%)/876	1351 (76%)/1769	1318 (75%)/1762	1264 (72%)/1749	1297 (74%)/1756
Delivered in facility	2541 (72%)/3518	648 (74%)/880	599 (69%)/873	674 (76%)/889	620 (71%)/876	1322 (75%)/1769	1273 (72%)/1762	1219 (70%)/1749	1268 (72%)/1756
Immediately breastfed	2000 (57%)/3519	496 (56%)/880	508 (58%)/874	505 (57%)/889	491 (56%)/876	1001 (57%)/1769	1013 (57%)/1763	999 (57%)/1750	987 (56%)/1756
Clean cord care	1360 (39%)/3519	349 (40%)/880	331 (38%)/874	319 (36%)/889	361 (41%)/876	668 (38%)/1769	650 (37%)/1763	692 (40%)/1750	710 (40%)/1756
Received birth certificate	830 (24%)/3519	198 (23%)/880	199 (23%)/874	242 (27%)/889	191 (22%)/876	440 (25%)/1769	441 (25%)/1763	390 (22%)/1750	389 (22%)/1756

Data are n (%)/N, unless otherwise indicated. ASHA=Accredited Social Health Activist.

**Table 1: Baseline characteristics and outcomes by intervention group**

A factorial analysis for the primary and secondary outcomes is shown in table 2. Report cards targeted at health providers did not have a significant effect on the proportion of women who had at least four antenatal care visits (OR 0.85, 95% CI 0.65–1.13; p=0.264). Similarly, report cards targeted at the community did not significantly affect the proportion of women receiving four antenatal care visits (0.86, 0.65–1.13; p=0.276). Notably, the proportion of women who received four antenatal care visits remained low after the interventions, with

plenty of scope for improvement. Neither intervention had a significant effect on the secondary outcomes. There were no differences in the other outcomes, with most ORs close to 1.0.

The results of the treatment group analysis, which compared outcomes in each intervention with those in the control group, are shown in table 3. There was no evidence that either intervention, alone or in combination, had an effect on the primary outcome: we found no significant difference in the proportion of women

	n (%) / N		Odds ratio		Marginal effect	
	Intervention group	Comparison group	Effect size (95% CI)	p value	Effect size (95% CI)	p value
<b>Provider groups (versus non-provider groups)</b>						
Four or more antenatal care visits	442 (28%)/1593	462 (30%)/1540	0.85 (0.65 to 1.13)	0.264	-0.030 (-0.083 to 0.024)	0.264
Counselling on all danger signs	265 (17%)/1593	231 (15%)/1540	1.12 (0.88 to 1.42)	0.343	0.015 (-0.016 to 0.045)	0.344
Tetanus immunisation during antenatal care	1335 (85%)/1576	1269 (83%)/1528	1.16 (0.88 to 1.53)	0.297	0.018 (-0.016 to 0.051)	0.297
ASHA visit during antenatal care	1310 (82%)/1593	1197 (78%)/1540	1.33 (0.91 to 1.95)	0.143	0.039 (-0.013 to 0.091)	0.145
Delivered in facility	1533 (79%)/1936	1445 (77%)/1866	1.12 (0.85 to 1.46)	0.427	0.017 (-0.025 to 0.058)	0.427
Immediately breastfed	1323 (68%)/1936	1306 (70%)/1866	0.94 (0.78 to 1.12)	0.475	-0.014 (-0.052 to 0.024)	0.475
Clean cord care	881 (46%)/1936	866 (46%)/1866	0.96 (0.82 to 1.14)	0.663	-0.009 (-0.050 to 0.032)	0.663
Received birth certificate	591 (31%)/1936	542 (29%)/1866	1.07 (0.87 to 1.31)	0.544	0.013 (-0.029 to 0.055)	0.544
<b>Community groups (versus non-community groups)</b>						
Four or more antenatal care visits	432 (27%)/1579	472 (30%)/1554	0.86 (0.65 to 1.13)	0.276	-0.030 (-0.083 to 0.024)	0.276
Counselling on all danger signs	271 (17%)/1579	225 (15%)/1554	1.21 (0.96 to 1.54)	0.112	0.025 (-0.006 to 0.055)	0.112
Tetanus immunisation during antenatal care	1308 (84%)/1561	1296 (84%)/1543	0.99 (0.75 to 1.30)	0.935	-0.001 (-0.035 to 0.032)	0.935
ASHA visit during antenatal care	1297 (82%)/1579	1210 (78%)/1554	1.42 (0.97 to 2.08)	0.073	0.047 (-0.005 to 0.099)	0.075
Delivered in facility	1518 (79%)/1920	1460 (78%)/1882	1.14 (0.87 to 1.49)	0.337	0.020 (-0.012 to 0.062)	0.338
Immediately breastfed	1333 (69%)/1920	1296 (69%)/1882	1.03 (0.86 to 1.23)	0.775	0.006 (-0.033 to 0.044)	0.775
Clean cord care	877 (46%)/1920	870 (46%)/1882	0.99 (0.83 to 1.16)	0.867	-0.004 (-0.045 to 0.038)	0.867
Received birth certificate	595 (31%)/1920	538 (29%)/1882	1.12 (0.91 to 1.37)	0.293	0.023 (-0.020 to 0.065)	0.293

Provider groups are the provider group plus the provider and community group, and community groups are the community group plus the provider and community group. Non-provider groups are community and control groups, and non-community groups are provider and control groups. ASHA=Accredited Social Health Activist.

**Table 2: Factorial analysis of primary and secondary outcomes**

who had at least four antenatal care visits between the control group and the group in which report cards were given to health providers only (OR 0.78, 95% CI 0.53–1.15;  $p=0.211$ ), between the control group and the group in which report cards were only given to the community (0.78, 0.53–1.16;  $p=0.218$ ), or between the control group and the group in which report cards were given to both health providers and the community (0.73, 0.50–1.08;  $p=0.117$ ). None of the interventions had a significant effect on the secondary outcomes, except in the group in which report cards were targeted to both health providers and the community, which showed an increase in the proportion of women receiving a visit by an ASHA during pregnancy (1.89, 1.10–3.25;  $p=0.021$ ). Our findings were not affected by sensitivity analyses in which we controlled for the outcome at baseline (appendix pp 10–11) or alternative definitions of exposure to the intervention (appendix p 13). Use of data from the second follow-up survey round only showed very similar results to those of our primary analysis (appendix p 14). The ICC values for the study outcome are shown in the appendix (p 16).

## Discussion

Strategies to increase the participation and accountability of citizens in the provision of health services are

increasingly popular approaches to address shortcomings in service provision in low-income and middle-income countries. Social accountability is a prominent part of the Indian Government's flagship National Health Mission, as laid out in its Community Action for Health programme.<sup>14</sup> In our study, we evaluated a similar social accountability approach, implemented by a local non-governmental organisation by use of a cluster-randomised controlled trial, and we found that neither informing providers nor engaging community leaders with a report card on performance of maternal and neonatal health services prompted a significant improvement in coverage of these health services along the continuum of care. Notably, this result was found in the context of rapidly increasing coverage of antenatal care.

Our study had several strengths. The study was a multi-group trial, whose design was motivated by a theory of change of how report cards might work—by leveraging providers' pro-social motivation or by increasing citizens' voice, community participation, and accountability—to improve coverage of maternal health services. The surveys showed a very high response and the study was reasonably well powered: although the proportion of women who had four or more antenatal care visits in the control group was twice as high as anticipated, the ICC for the primary outcome was lower than anticipated.

	n (%) / N		Odds ratio		Marginal effect	
	Intervention group	Control group	Effect size (95% CI)	p value	Effect size (95% CI)	p value
<b>Provider group</b>						
Four or more antenatal care visits	227 (29%) / 795	245 (32%) / 759	0.78 (0.53 to 1.15)	0.211	-0.048 (-0.123 to 0.027)	0.210
Counselling on all danger signs	120 (15%) / 795	105 (14%) / 759	1.10 (0.78 to 1.56)	0.573	0.013 (-0.031 to 0.057)	0.574
Tetanus immunisation during antenatal care	673 (85%) / 790	623 (83%) / 753	1.28 (0.86 to 1.89)	0.219	0.030 (-0.018 to 0.078)	0.219
ASHA visit during antenatal care	638 (80%) / 795	572 (75%) / 759	1.35 (0.79 to 2.30)	0.272	0.040 (-0.032 to 0.113)	0.273
Delivered in facility	745 (78%) / 954	715 (77%) / 928	1.08 (0.74 to 1.58)	0.685	0.012 (-0.046 to 0.071)	0.685
Immediately breastfed	646 (68%) / 954	650 (70%) / 928	0.91 (0.70 to 1.17)	0.464	-0.020 (-0.074 to 0.034)	0.464
Clean cord care	427 (45%) / 954	443 (48%) / 928	0.89 (0.70 to 1.13)	0.329	-0.029 (-0.087 to 0.029)	0.329
Received birth certificate	280 (29%) / 954	258 (28%) / 928	1.08 (0.81 to 1.45)	0.603	0.016 (-0.044 to 0.076)	0.603
<b>Community group</b>						
Four or more antenatal care visits	217 (28%) / 781	245 (32%) / 759	0.78 (0.53 to 1.16)	0.218	-0.047 (-0.122 to 0.028)	0.217
Counselling on all danger signs	126 (16%) / 781	105 (14%) / 759	1.19 (0.85 to 1.68)	0.310	0.023 (-0.021 to 0.066)	0.311
Tetanus immunisation during antenatal care	646 (83%) / 775	623 (83%) / 753	1.09 (0.74 to 1.60)	0.665	0.010 (-0.037 to 0.057)	0.665
ASHA visit during antenatal care	625 (80%) / 781	572 (75%) / 759	1.44 (0.84 to 2.46)	0.185	0.049 (-0.024 to 0.122)	0.186
Delivered in facility	730 (78%) / 938	715 (77%) / 928	1.11 (0.76 to 1.62)	0.602	0.016 (-0.043 to 0.074)	0.602
Immediately breastfed	656 (70%) / 938	650 (70%) / 928	1.00 (0.77 to 1.29)	0.978	0.001 (-0.055 to 0.054)	0.978
Clean cord care	423 (45%) / 938	443 (48%) / 928	0.91 (0.72 to 1.15)	0.431	-0.023 (-0.082 to 0.035)	0.431
Received birth certificate	284 (30%) / 938	258 (28%) / 928	1.13 (0.84 to 1.52)	0.405	0.026 (-0.035 to 0.086)	0.405
<b>Provider and community group</b>						
Four or more antenatal care visits	215 (27%) / 798	245 (32%) / 759	0.73 (0.50 to 1.08)	0.117	-0.060 (-0.135 to 0.015)	0.116
Counselling on all danger signs	145 (18%) / 798	105 (14%) / 759	1.36 (0.97 to 1.90)	0.073	0.039 (-0.004 to 0.082)	0.074
Tetanus immunisation during antenatal care	662 (84%) / 786	623 (83%) / 753	1.14 (0.78 to 1.68)	0.495	0.016 (-0.031 to 0.063)	0.495
ASHA visit during antenatal care	672 (84%) / 798	572 (75%) / 759	1.89 (1.10 to 3.25)	0.021	0.086 (0.012 to 0.160)	0.023
Delivered in facility	788 (80%) / 982	715 (77%) / 928	1.27 (0.87 to 1.86)	0.212	0.037 (-0.021 to 0.096)	0.212
Immediately breastfed	677 (69%) / 982	650 (70%) / 928	0.96 (0.74 to 1.24)	0.756	-0.009 (-0.062 to 0.045)	0.756
Clean cord care	454 (46%) / 982	443 (48%) / 928	0.95 (0.75 to 1.20)	0.656	-0.013 (-0.071 to 0.044)	0.656
Received birth certificate	311 (32%) / 982	258 (28%) / 928	1.19 (0.89 to 1.59)	0.238	0.036 (-0.024 to 0.096)	0.237

ASHA=Accredited Social Health Activist.

**Table 3: Analysis of primary and secondary outcomes in treatment groups**

However, our study had several limitations. Measurement error linked to recall problems and women having to remember past events could have attenuated our estimates of effects. We only used two rounds of feedback, so the intervention might not have been delivered at the required intensity to generate an effect. It is possible that more frequent feedback to communities would have applied greater pressure for accountability and enabled more women to access the information in the report cards. Although we cannot rule out such a possibility, the results do not suggest an effect, which would be expected if a dose-response relationship of this nature existed. The intervention was delivered by a local non-governmental organisation, and the findings might not generalise well to an equivalent intervention delivered by the public sector.

Our findings are consistent with several other studies on community participation and accountability in

low-income and middle-income countries. Local monitoring did not improve attendance of health workers in clinics in Rajasthan,<sup>21</sup> nor did participation in community meetings reduce corruption in Indonesia.<sup>22</sup> There is evidence from Tanzania and Uganda that report cards, specifically, might not be an effective strategy to improve the quality of service provision.<sup>23</sup> The use of a collaborative approach that involved participants at district, facility, and community levels, supported by report cards that were generated with household and facility surveys, did not lead to an improvement in coverage and quality of maternal and neonatal health services. A combination of scorecards on learning scores and community meetings did not lead to improvements in teacher effort and learning outcomes in a randomised trial<sup>24</sup> in Uttar Pradesh.

There are a few studies on report cards that have found positive results. Provider scorecards delivered to schools and parents in Pakistan improved learning outcomes,

encouraged private schools to reduce their school fees, and increased enrolment.<sup>25</sup> Similarly to our study, this intervention included only two rounds of feedback; however, the target recipients of the feedback sessions were parents of children, rather than the community as a whole. A randomised controlled trial<sup>17</sup> of report cards in the primary health sector of Uganda showed an increase in use of general outpatient services, antenatal care and family planning services and, most notably, a reduction in under-5 child mortality. Also of note, the participatory meetings involved the creation of action plans and community contracts outlining an agreement on roles and responsibilities for service improvement. Such action plans were then subject to regular monitoring by the community. However, a preliminary report<sup>18</sup> of a similar but larger trial in Uganda showed no effects on health or health care-seeking behaviours. Finally, a qualitative study<sup>26</sup> showed that maternal health report cards improved accountability and community participation in Ghana.

The design of any social accountability intervention involves choices over the content of information and the delivery of that information, and variations along these dimensions are motivated by different theories of change. The report cards that we evaluated did not contain information on performance of individual providers. Such an intervention is quite different, since it seeks to improve quality of care by changing market dynamics and the health care-seeking choices of patients. Nor was the intervention designed primarily to deliver information to as many women of childbearing age as possible. In this respect, it is perhaps instructive to compare our findings with the large effect on immunisation reported in a 2018 trial<sup>27</sup> of home visits to educate mothers on the benefits of the combined diphtheria–pertussis–tetanus vaccine that was done in the same setting. Community-based interventions, such as self-help women’s groups and participatory women’s groups, have also shown encouraging effects on health.<sup>28,29</sup> Again, these interventions targeted women of childbearing age rather than community leaders, as did the successful intervention in Pakistani schools that delivered report cards directly to parents.<sup>25</sup> Finally, it is noteworthy that our report cards were delivered by non-medical staff, which could have affected how the feedback was received by the health providers.

The community group intervention that we evaluated was designed to engage local leaders and to make them more accountable to the public, such that they would devise strategies to improve the supply of and demand for services behind the indicators contained within the report cards. Based on extensive monitoring data (including the GPS coordinates of meetings, start and end time of each meeting, number and type of participants in attendance, responses of the meeting facilitators to a series of structured questions on participation, and qualitative reports from all facilitators), we believe the interventions were well implemented.

What then are the possible reasons for the failure of the intervention?

First, community members who participated in the meetings listed several strategies that they planned to undertake in the year after the intervention, to improve maternal and neonatal health in their community. However, most of these strategies were vague and lacked specificity. Some common responses included “I will give advice during visits [or community meetings]”, “I will create awareness and talk to women”, and “I will spread awareness and encourage women to access to services”. Community leaders and other members neither initiated systematic monitoring of these strategies nor committed to specific tasks and deadlines. During feedback meetings, community leaders did not assign clear responsibilities to specific community members.

Second, the intervention did not provide communities with the tools and resources to undertake the activities that they deemed a priority. Community leaders showed interest in the information that was fed back to them and a desire to act, but they did not appear to have the means to turn this interest into action to improve health service coverage in their villages. This line of reasoning is consistent with the conclusion of a related study<sup>24</sup> in education, in which the authors argued that information alone might not be enough to mobilise communities unless it is accompanied by specific actions supported (with resources and instruments) by actors from outside the community. There is also evidence that information alone is not sufficient for health providers to improve practice.<sup>30</sup>

Finally, the local leaders targeted by the intervention might have seen themselves as largely responsible for infrastructural developments, such as road construction, thereby giving low priority to maternal and child health issues. It is of note that most community leaders were male, which raises important questions around representation in village councils, as highlighted by a study<sup>31</sup> on political reservations in India that showed that women leaders invest more in public goods relevant to their own sex.

Our study contributes to the medical literature on social accountability and community-based monitoring in health care by demonstrating that a report card intervention, which is similar to the Indian Government’s approach, was not successful in improving the coverage of maternal and neonatal health care in Uttar Pradesh. Our findings apply to the precise form of the intervention that we evaluated, but a possibility remains that an alternative design could be effective—our findings do not demonstrate the failure of information per se. Future research should seek to understand how the content of information and the delivery of the report cards affect the success of interventions. The process through which report cards are introduced, presented, and discussed, and who they are targeted at are likely to affect engagement in participatory meetings and the likelihood of improving desired outcomes.

**Contributors**

VD, VS, KS, and TP-J designed the study and all authors collected and interpreted data. CF and TP-J analysed the data and wrote the first draft of the manuscript, with input from all authors.

**Declaration of interests**

We declare no competing interests.

**Data sharing**

The statistical code and full dataset, in an anonymised format, will be made available from the London School of Hygiene Data Repository.

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For the dataset and statistical code see <http://datacompass.lshm.ac.uk/>