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Original Research Article

Effectiveness of Community-Based Interventions for Improving Maternal and Child Health Outcomes in Low-Middle-Income Areas in Pakistan

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Abstract: *Maternal and child health (MCH) outcomes remain a major public health concern in Pakistan, particularly in low- and middle-income areas where access to health services is limited.* ***Objective:*** *To assess the effectiveness of community-based interventions in improving maternal and child health outcomes in underserved areas of Pakistan.* ***Methods:*** *This cross-sectional analytical study was conducted at Services Hospital, Lahore, from November 2024 to April 2025. A total of 245 participants, including pregnant women, mothers of children under five years, and primary caregivers. Data were collected using a structured questionnaire on maternal health practices, child health indicators, and exposure to community-based interventions such as lady health worker visits, counseling sessions, and health education campaigns.* ***Results:*** *Among participants, 77.1% reported at least one ANC visit, while 51.4% completed four or more visits. Institutional deliveries were recorded in 61.6%, and PNC within 48 hours in 43.7%. Immunization coverage was 74.7%, and exclusive breastfeeding was practiced in 59.2% of cases. Exposure to CBIs was significantly associated with better outcomes: ≥4 ANC visits (64.8% vs. 34.1%, $p < 0.01$), institutional delivery (71.2% vs. 46.8%, $p < 0.01$), full immunization (82.1% vs. 61.9%, $p < 0.01$), and exclusive breastfeeding (65.7% vs. 47.2%, $p = 0.02$). Logistic regression confirmed independent associations between CBI exposure and improved maternal and child health outcomes. Overall satisfaction with CBIs was high (72.6%), although some participants reported irregular visits and referral gaps.* ***Conclusion:*** *Community-based interventions significantly improve maternal and child health outcomes in low- and middle-income areas of Pakistan.*

Keywords: Breastfeeding, Community Health Services, Health Services Accessibility, Maternal Health Services, Prenatal Care.

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Introduction

Maternal and child health (MCH) outcomes remain a core stress test for any health system, and in low- and middle-income settings, the gap between what we know works and what actually reaches families is still too wide. Closing that gap is done by community-based interventions (CBIs) (1). They take established practices such as timely antenatal care, skilled birth preparedness, necessary newborn care, routine immunization, optimal breastfeeding, growth monitoring, and prompt care-seeking of childhood illness, out of clinics and into homes, mohallas, and villages. CBIs do not require that patients travel to facilities (which can be far, expensive, and intimidating) but instead deliver services, information, and social support to mothers, caregivers, and community decision-makers (2). Pakistan is a rather significant background to consider CBIs. The country's population is large, diverse, and unevenly covered by health infrastructure; urban informal settlements and remote rural districts share overlapping disadvantages, including geographic distance, out-of-pocket expenses, gender mobility restrictions, and information asymmetry (3). In the last 20 years, Pakistan has implemented various community-based initiatives, such as lady health workers and community midwives, polio and EPI outreach, nutrition counseling and supplementation, basic WASH and hygiene promotion, integrated community case management (iCCM), and (more recently) digital/mHealth touchpoints and conditional cash support overlaid on social protection platforms (4). Such initiatives reflect a transition from episodic campaigns to more continuing, relationship-based primary care at the door. CBIs have a simple theory of change: proximate workers that are trusted, embedded in local social networks, can (1) enhance high-impact interventions, (2) change norms by influencing peers and women groups, (3) decrease first and second delays of the care cascade via counseling, birth preparedness, and referral linkages, and (4) enhance continuity of care between pregnancy and the first 1,000 days of life (5). CBIs can transform weak coverage into strong access when combined with the basic technologies (e.g., registries, reminder systems, decision-support tools) and supply-side preparedness (commodities, referral pathways) (6-8). Notwithstanding this undertaking, Pakistan still experiences some of the greatest maternal and neonatal deaths in South Asia. It is estimated that each year, thousands of preventable maternal and infant deaths are caused by failures to access the right care at the right time, by low-quality services provided, and interruptions in continuity between facility-based care and community-based care (9). CBIs do not merely complement each other in such an environment; they are necessary to address structural inequalities. The Lady Health Workers (LHWs), a flagship cadre initiated in the nineties, are an example of health promoters on the ground (10). They have been linked to high levels of immunization, the uptake of contraceptives, and awareness of antenatal and postnatal services. However, their potential is often diluted by shortcomings in training, supervision, and supply logistics (11-13).

Thus, this study aims to assess the effectiveness of community-based interventions in improving maternal and child health outcomes in underserved areas of Pakistan.

Methodology

This cross-sectional analytical study was conducted at Services Hospital, Lahore, from November 2024 to April 2025. A total of 245 participants, including pregnant women, mothers of children under five years, and primary caregivers. The sample comprised pregnant women, mothers of children under five years of age, and primary caregivers, all residing in low- and middle-income areas. Non-probability consecutive sampling was used to recruit participants who met the inclusion criteria.

Inclusion Criteria:

- Women aged 18–45 years who were either currently pregnant or had at least one child under five years of age.
- Residents of the study area for at least six months.
- Willing to provide informed consent and participate in the survey.

Exclusion Criteria:

- Women or caregivers unwilling to participate.
- Families planning to migrate out of the study area during the data collection period.
- Patients with severe illness that prevented participation in interviews.

Data were collected using a structured questionnaire that was developed after an extensive review of relevant literature and validated through a pilot study in a comparable setting. The questionnaire contained socio-demographic (age, education, household income) and maternal health (antenatal care, place of delivery, and postnatal care), and child health (immunization status, breastfeeding practice, and seeking care during illness) questions. In addition, the participants were also asked about their experiences with specific community-based interventions, such as visits from lady health workers, participation in group counseling sessions, and use of digital health reminders. Face-to-face interviews were conducted with trained data collectors using locally spoken languages to ensure understanding, precision, and cultural relativism. Mother and child health indicators, including provider use and behavioral change, such as the number of antenatal care visits, institutional births, postnatal care coverage, immunization rates, exclusive breastfeeding, and timely access to care for childhood illnesses, were the primary outcomes of interest.

All data were entered and analyzed using SPSS (version 27.0). Descriptive statistics, including means and standard deviations for continuous variables and frequencies and percentages for categorical variables, were used to summarize the participants' baseline characteristics. The Chi-square test was employed to determine associations between exposure to community-based interventions and health outcomes. Statistical significance was set at a p-value of ≤ 0.05 for all analyses.

Results

A total of 245 participants were included in the analysis. The mean age of the participating mothers was 28.3 ± 5.2 years, reflecting a relatively young reproductive age group. A majority of women (62.9%) were from rural districts, while 37.1% resided in urban slums. Educational attainment was generally low, with 42.4% of women reporting no formal education and only 18.4% completing secondary school or higher. The mean monthly household income was PKR 24,000 ± 9,500, underscoring the socioeconomic challenges faced by the study population. Regarding maternal health practices, most women (77.1%) had attended at least one antenatal care (ANC) visit during their most recent pregnancy. Still, only about half (51.4%) achieved the recommended minimum of four ANC visits. Institutional delivery was reported in 61.6% of cases, while 38.4% gave birth at home, often under the care of traditional birth attendants or family members. Postnatal care coverage remained limited, with only 43.7% receiving care within 48 hours of delivery, although this improved to 68.6% within the first week.

Table 1. Baseline Demographic Characteristics of Participants (N = 245)

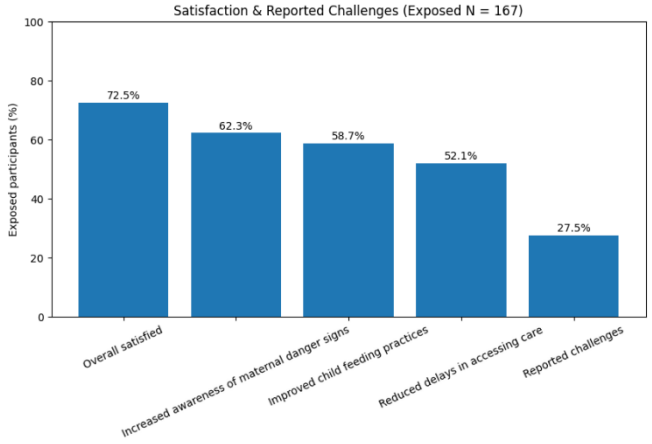
Variable	n (%) / Mean ± SD
Age (years), mean ± SD	28.3 ± 5.2
Residence	
Rural	154 (62.9%)
Urban slum	91 (37.1%)
Education level	
No formal education	104 (42.4%)
Primary–Middle	96 (39.2%)
Secondary or higher	45 (18.4%)
Monthly household income (PKR)	24,000 ± 9,500
Maternal Health Practices	
At least one ANC visit	189 (77.1%)
≥ 4 ANC visits	126 (51.4%)
Place of delivery	
Institutional	151 (61.6%)
Home (TBA or family member)	94 (38.4%)
Postnatal care (PNC)	
Within 48 hours	107 (43.7%)
Within 7 days	168 (68.6%)

Child health outcomes showed a mixed picture. A relatively high proportion of children (74.7%) were fully immunized according to the Expanded Programme on Immunization (EPI) schedule. Exclusive breastfeeding during the first six months was reported by 59.2% of mothers, while 28.2% introduced complementary foods before six months. Growth monitoring was reported by just over half of the mothers (54.3%). Regarding satisfaction with community-based interventions, 72.6% of participants reported overall satisfaction. The most commonly reported benefits were increased awareness of maternal danger signs (62.3%), improved child feeding practices (58.7%), and reduced delays in accessing care (52.1%).

Table 2. Child Health Indicators (Children under 5 years, n = 245)

Variable	n (%)

Fully immunized (per EPI schedule)	183 (74.7%)
Exclusive breastfeeding (0–6 months)	145 (59.2%)
Early complementary feeding (<6 months)	69 (28.2%)
Growth monitoring reported	133 (54.3%)
Stunting (Height-for-age < –2 SD)	60 (24.5%)
Satisfaction	
Overall, satisfied with interventions	121 (72.6%)
Increased awareness of maternal danger signs	104 (62.3%)
Improved child feeding practices	98 (58.7%)
Reduced delays in accessing care	87 (52.1%)
Reported challenges (irregular visits, supplies, referral gaps)	46 (27.4%)



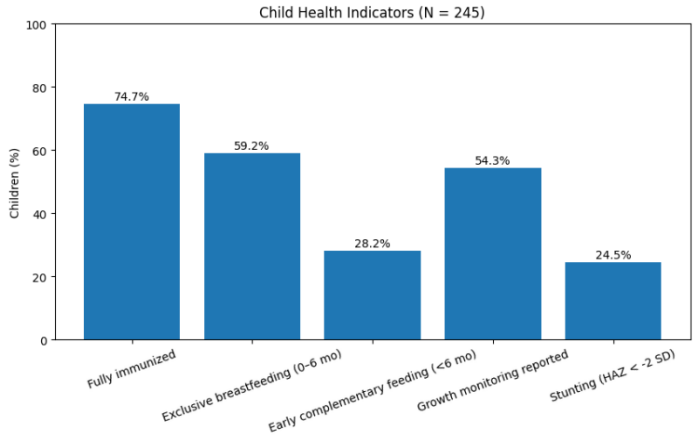


Figure 1: Satisfaction and reported challenges in study population: …Figure 2: Child health indicators of children under 5 years schildren

Exposure to CBIs was significantly associated with improved maternal and child health practices. Among women exposed to CBIs, 64.8% had four or more ANC visits, compared with only 34.1% among those without exposure ($p < 0.01$). Institutional delivery was reported by 71.2% of women with exposure, versus 46.8% without Exposure ($p < 0.01$). Postnatal care within 48 hours was also higher in the intervention group (52.1% vs. 25.6%, $p < 0.01$). Full immunization was significantly higher among exposed participants (82.1% vs. 61.9%, $p < 0.01$), and exclusive breastfeeding rates were also greater (65.7% vs. 47.2%, $p = 0.02$).

Table 3. Effect of Community-Based Interventions (CBIs) on Maternal and Child Health Outcomes (N = 245)

Outcome Variable	With CBI Exposure (n=167)	Without CBI Exposure (n=78)	p-value
≥ 4 ANC visits	108 (64.8%)	27 (34.1%)	<0.01
Institutional delivery	119 (71.2%)	32 (46.8%)	<0.01
PNC within 48 hours	87 (52.1%)	20 (25.6%)	<0.01
Fully immunized children	137 (82.1%)	48 (61.9%)	<0.01
Exclusive breastfeeding	110 (65.7%)	37 (47.2%)	0.02

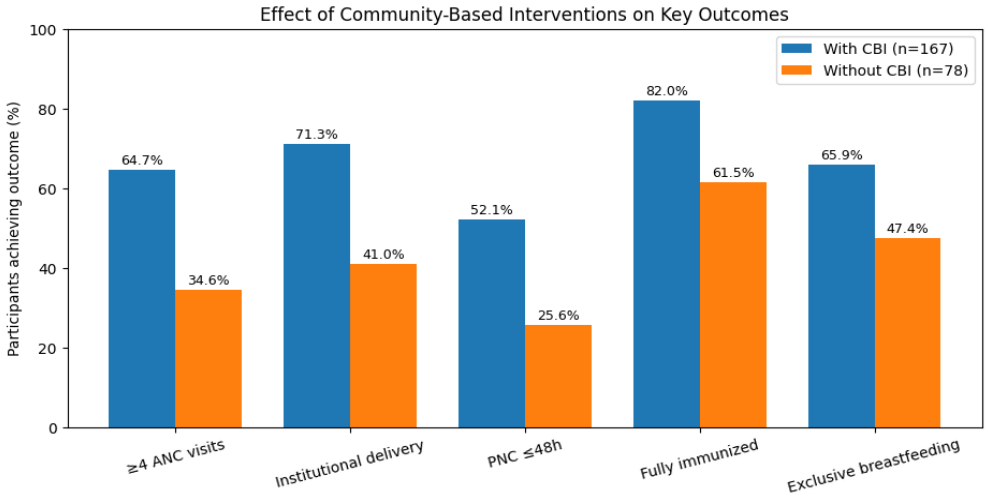


Figure 3: Effect of community-based interventions on key outcomes

Women exposed to CBIs had more than twice the odds of completing four or more ANC visits (AOR = 2.4, 95% CI: 1.5–3.9, $p < 0.01$) and delivering in a health facility (AOR = 2.1, 95% CI: 1.3–3.3, $p < 0.01$). Similarly, exposure significantly increased the likelihood of having a fully immunized child (AOR = 2.7, 95% CI: 1.6–4.5, $p < 0.01$). Exclusive breastfeeding was also positively associated with exposure (AOR = 1.8, 95% CI: 1.1–3.1, $p = 0.03$).

Table 4. Multivariable Logistic Regression Analysis of Factors Associated with Maternal and Child Health Outcomes

Outcome Variable	Adjusted Odds Ratio (AOR)	95% Confidence Interval	p-value
≥ 4 ANC visits	2.4	1.5 – 3.9	<0.01
Institutional delivery	2.1	1.3 – 3.3	<0.01
Fully immunized child	2.7	1.6 – 4.5	<0.01
Exclusive breastfeeding	1.8	1.1 – 3.1	0.03

Discussion

In this case, an evaluation of the efficacy of community-based interventions (CBIs) to enhance maternal and child health outcomes in low- and middle-income communities in Pakistan was conducted, and 245 individuals were targeted in the study. The results indicate that women and caregivers with CBI exposure exhibited greater maternal and child health practices, including increased use of antenatal care, institutional births, prompt postnatal checkups, higher immunization rates, and higher rates of exclusive breastfeeding. These findings highlight the importance of community health programs in addressing the current gap between access to health services and service uptake among underprivileged groups. The researchers found that women in the exposure group of CBI were twice as likely to have four or more visits to the ANC and to give birth in a health facility. This is consistent with findings from prior studies showing that visits by community health workers, home-based counseling, and group mobilization significantly increase the use of maternal health services (14). It is probably a multifactorial mechanism that includes: better knowledge of the signs of danger during pregnancy, increased trust in health services due to frequent communication with frontline workers, and increased readiness to deliver. Furthermore, these interventions shortened the first two delays in maternal care, which are familiar causes of maternal mortality in Pakistan and other comparable regions: decision-making and reaching facilities (15).

CBIs also improved child health outcomes, with rates significantly higher among those exposed, particularly for fully immunized status and exclusive breastfeeding. Past research has shown that families whose community health workers visit tend to adhere to immunization plans and other best practices regarding baby feeding. An emphasis on repetitive contact, health message reinforcement, and the development of social norms at the community level seems to be a key driver (16). This observation indicates that socio-economic status remains a significant factor. Still, community-level interventions can alleviate structural inequalities and offer disadvantaged groups a more equal opportunity to access necessary services. Notably, this is consistent with international findings that CBIs are among the most cost-effective interventions for reducing maternal and child mortality, particularly in resource-constrained settings (17).

Satisfaction levels reported by the participants also give a good idea. Almost three out of every four women said they were satisfied with CBIs because they felt better about health practices. One-fourth, however, noted gaps, including inconsistent worker visits, shortages of key supplies, and low referral connections (18). These issues reflect structural bottlenecks in most community health programs in Pakistan, including the Lady Health Worker program. Increasing the intensity of supervision, maintaining stable supplies, and making community workers more closely associated with facility-based services are, therefore, critical to the efficiency of these programs. Although the findings strongly support the utility of CBIs, this research has limitations (19,20). A cross-sectional design cannot be used to make causal inferences because the relationship of the variables might not be entirely temporal. Also, the information was self-reported so that it may be affected by recall or social desirability bias. However, the weaknesses do not overshadow the research's strength: it addresses real-world community interventions in rural and urban underserved environments and offers practical information on policy and practice. The extent of this study is meaningful. Pakistan is trying to achieve the Sustainable Development Goals (SDGs), especially SDG 3 on maternal and child health. By targeting populations sometimes overlooked by traditional facility-based services, community-based approaches can help accelerate progress. The implementation of CBIs at scale, with sufficient training, supervision, and integration into the primary healthcare system, might be a solution to enhancing coverage and equity.

Conclusion

It is concluded that community-based interventions are highly effective in improving maternal and child health outcomes in low- and middle-income areas of Pakistan. Women exposed to these interventions were more likely to attend recommended antenatal care visits, deliver in health facilities, receive timely postnatal care, and ensure appropriate immunization and exclusive breastfeeding for their children. These outcomes highlight the pivotal role of community health workers and localized health promotion activities in reducing barriers to care and strengthening the continuum of maternal and child health services.

Declarations

Data Availability statement

All data generated or analysed during the study are included in the manuscript.

Ethics approval and consent to participate

Approved by the department concerned. (IRBEC--24)

Consent for publication

Approved

Funding

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Conflict of interest

The authors declared no conflict of interest.

Author Contribution

UJ (PHD Scholar)

Manuscript drafting, Study Design,

HJ (Ex PGT)

Review of Literature, Data entry, Data analysis, and drafting articles.

UM (Chief Strategy)

Conception of Study, Development of Research Methodology Design

TA

Study Design, manuscript review, and critical input.

HS
drafting articles, Development of Research Methodology Design

All authors reviewed the results and approved the final version of the manuscript. They are also accountable for the study's integrity.

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