

Factors associated with child health service delivery by female community health volunteers in Nepal: Findings from a national survey

Hari Krishna Bhattarai (✉ hkrishnabhattacharai@gmail.com)

John Snow Incorporation, Nepal

Pratik Khanal

Tribhuvan University Institute of Medicine

Vishnu Khanal

Nepal Development Society

Kiran Regmi

Former Secretary of Ministry of Health Nepal

Narendra Raj Paudel

Tribhuvan University Central Department of Public Administration

Liladhar Dhakal

Nepal Development Society

Samikshya Singh

JSI Research and Training Institute Inc

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Abstract

Background Nepal has made a significant improvement in child survival in the last few decades and the involvement of female community health volunteers (FCHVs) has been crucial in such achievement. While there have been a lot of documented studies and reports, rarely has been explored the status and factors associated with the child health service provided by these volunteers. This study aimed to measure the child health service delivery status by FCHVs and its associated factors. Methods A national survey was conducted in 2014 in Nepal that included 4,302 FCHVs using the structured questionnaire across the 13 geopolitical domains of the country. The data was extracted and the association of child health services with characteristics was examined using Chi-square test (χ^2) followed by logistic regression. Results Two out of three FCHVs provided at least one child health service. Those FCHVs who utilized money from the FCHV fund, conducted mothers' group meeting, involved in the local committees and those who supported in antenatal care related activities were more likely to provide child health services. Similarly, FCHVs having the stock of cotrimoxazole tablet, Zinc tablet, oral rehydration salt were also more likely to provide child health services. Province wise analysis showed that FCHVs from Province 5 and Province 7 were more likely to provide child health services compared to their counterparts from province 1. Conclusions FCHVs are an important human resource in providing child health services in Nepal. To improve child health service delivery by FCHVs, availability of the key commodities, the involvement of FCHVs in regular health mothers' group meeting, use of mobile phone, involvement in other health programs and social networks, and utilization of fund need to be taken into consideration.

Introduction

The global under-five deaths have decreased from 12.6 million in 1990 to 5.4 million in 2017[1]. After Sub-Saharan Africa, South East Asia has the highest burden of under-five deaths. Diarrhoea and pneumonia are still the major killer diseases among the under-five year children globally and nationally[2, 3]. Acute Respiratory Infection (ARI) and associated fever, dehydration from diarrhoea and malnutrition are the important contributing causes of childhood morbidity and mortality in developing countries. Most child deaths are caused by diseases that are readily preventable or treatable with proven, cost-effective and quality-delivered interventions [2].

In developing countries, health system suffers from a chronic shortage of human resources. In this context, the mobilization of community health workers or volunteers has been seen as a cost-effective and promising health system intervention[4]. Nepal started the Female Community Health Volunteers (FCHVs) program in 1988. This program was designed to

enhance Nepal's primary health care service delivery network, improve community participation, and expand the outreach of health services in doorsteps. The program was established in all 75 districts of the country by 1995 [5].

Nepal initiated community-based diarrhoeal disease control program in 1982 involving local health workers to promote home-based oral rehydration therapy and case management at the health facilities. This intervention, which also involved FCHVs after their introduction in the health system, had an important role in reducing child morbidity and mortality attributed by diarrhoea. In 1997, an evaluation of community-based pneumonia case management supported by World Health Organization (WHO) further opened the door to involve the FCHVs to treat the pneumonia cases [6]. Given that the percentage of diarrheal cases treated with Oral Rehydration Salt (ORS) and zinc by FCHVs among the total diarrhoeal cases reported throughout the county was 64% in 2014/15 and 65% in 2015/16, they are an important cadre to curb child deaths and sickness. [3]. Recognizing the importance of community-based interventions, the Government of Nepal initiated community based-integrated management of childhood illness program (CB-IMCI) to address major childhood killer diseases (Diarrhoea, ARI, Measles, Malaria and Malnutrition). This intervention involved FCHVs to recognize and treat pneumonia and diarrhoea in children under five years of age, and refer the sick neonates and young infants with any danger signs including malnutrition[7].

The role of FCHVs was very crucial to achieve Millennium Development Goal 4 targets in Nepal [8, 9] which was also exemplary to the rest of the world. However, evidence regarding the FCHV program in Nepal [10, 11] has shown that the FCHV program has been inconsistent in delivering high-quality services across the nation. The factors affecting the service delivery by FCHVs identified in previous studies [10, 11] were mainly related to local leadership, work burden, geographical difficulties, inadequate training, limited monitoring and evaluation and incentive issues. In 2014, the Ministry of Health conducted a national survey on FCHVs[12] for assessing the performance of the FCHV program with a focus on their work profile. With this background, this study aimed to identify the child

health service delivery status by FCHVs and determine the factors associated with it using the data from the national survey.

Methods

Study design and sampling population

Data for the study was obtained from a nationally representative FCHV Survey conducted in 2014[12]. The survey was a cross-sectional study based on cluster design. For the study purpose, the country was divided into 13 domains considering ecological and developmental regions of the country. These 13 domains include 36,050 wards. Wards were the primary sampling unit. In each domain, the sampling frame of wards was created and wards were selected randomly to get sample size per domain. In total 257 urban and 4045 rural wards were selected for the sample. The details of the sampling procedure have been reported in the survey report [10].

The study included 4,302 FCHVs. They were interviewed using structured questionnaires.

These questionnaires were finalized based on the feedback received through pretest and experts. Trained enumerators were mobilized with a window-based tablet to collect the data. Information related to service delivery was obtained through review of the FCHV service register. A mobile platform namely "Enketo" linked with SurveyCTO was used to collect and analyze data. Detailed data collection methods have been discussed in the survey report [10].

Variables

The outcome variable in this study was the child health service provided by the FCHVs. It was defined as any one of the five services recorded in the service register of the FCHVs. These five services included: distribution of ORS to diarrhoea cases, distribution of Zinc tablet to a child suffering from diarrhea, examine the child for ARI, distribution of

cotrimoxazole pediatric tablet to a child suffering from pneumonia and counseling or referral service to the malnourished child.

Independent variables

Socio-demography, work profile of FCHVs, supports received by FCHVs, governance part of the FCHV program, availability of commodities and service delivery by FCHVs were studied.

Socio-demographic variables included the age, caste, educational status, residence and province were included. In the survey, FCHVs were labelled as “literate” if they had an education level of sixth grade and above, or if those with less than that level of schooling but could fully or partially read a simple sentence written in the card. Nepal has seven provinces in the changing political context (yet to be named) and has been named in number (1-7).

Work profile of the FCHVs included time taken to reach the health facility, use of mobile phone and years of work experience. The time taken to reach health facility was grouped in three categories (less than 30 minutes, 30-60 minutes and more than one hour) and years of work experience was also grouped into three categories (less than one year, 1-5 years and more than 5 years). Support received by FCHVs included information about basic training, dress allowance, incentive received and use of FCHV fund. Information on the availability of key commodities included the availability of ORS and zinc tablet to treat diarrhoea and Cotrimoxazole tablet to treat pneumonia. Service delivery by the FCHVs included information on the involvement of FCHVs on antenatal care (ANC) services, conducted health mothers' group meeting, supported in immunization clinics and supported in conduction of Primary Health Care/Out Reach Clinics (PHC/ORC). Governance part of the FCHV program included information about affiliation with FCHVs right based organization and involvement with other local committees.

Statistical analyses

Descriptive analysis was done by calculating frequencies and percentages. Then, the bivariate analysis (chi-square test) was performed to examine the association between dependent and independent variables. The multi-collinearity analysis was performed and variables which didn't have correlation value less than ± 0.5 were considered in the regression analysis. Multiple logistic regressions was employed to determine which variables could best explain the child health service delivery by FCHVs. Crude and adjusted odds ratios (AOR) were presented with 95% confidence interval (CI) and p-value of less than 0.05 were considered as statistical significance. Sampling weights was used to adjust the sampling distribution using "svy" in STATA 13 (StataCorp LP, College Station, TX, USA).

Ethics

The ethical approval for this study was obtained from the Nepal Health Research Council (Reference no: 122/2014) which is the national peak body that approves human researches and monitors such studies within the country. Written informed consent was taken from the study participants before the data collection and personal identifiers were removed during the data analysis.

Results

Services provided by FCHVs

Among the five child health services, more than the half (51.6%) of the FCHVs had treated at least one case of diarrhoea with ORS in the last three months, which was the highest among all the services provided. One out of ten FCHVs had counseled or referred to the malnourished child which was the lowest among all the services. More than two out of five FCHVs had treated at least one case of diarrhoea with Zinc and the same proportions had examined at least one case of a cough or cold. The proportion of FCHVs that had treated

the pneumonia cases with antibiotic Cotrimoxazole was 24.3%. Overall, around two-thirds (62.6%) of FCHVs had provided at least one child health service within the last three months prior to the survey (Table 1).

Relationship between socio-demographic profile of FCHVs and delivery of child health services

In the bivariate analysis, child health service delivery by FCHVs was associated with their literacy status, ethnic group, residence and province. Age of the FCHVs was not associated with child health service delivery (Table 2).

Relationship of child health service delivery with other background characteristics

Table 3 shows that child health service delivery was associated with the use of mobile phone, time to reach the nearest public health facility, training received, dress allowance received, incentive received, availability of all key commodities (Zinc, ORS, Cotrimoxazole), support in ANC service, support in PHC-ORC clinic, conduction of mother's group meeting, use of FCHV fund and involvement in local committees. On the other hand, child health service delivery was not associated with the support in immunization clinic and involvement with FCHV's right based organization.

Factors associated with child health service delivery

The results of multiple regression analyses are presented in Table 4. FCHVs from Muslim and other tarai caste were less likely to provide child health services compared to the hill caste FCHVs (AOR= 0.52, 95% CI: 0.32, 0.84). Likewise, FCHVs from Province 5 were 1.83 times (AOR=1.83, 95% CI: 1.43, 2.32) and those from province 7 were twice more likely to provide child health services (AOR=2.45, 95% CI: 1.89, 3.17) than the FCHVs from province 1.

Compared to the FCHVs who did not have ORS on stock, those with the stock were more likely to provide child health services (AOR= 1.44, 95% CI: 1.22, 1.70). Similarly, FCHVs who had Zinc tablet on stock were more likely to provide child health services than those who did not have Zinc on stock (AOR=1.48, 95% CI:

1.27, 1.72). Likewise, FCHVs who had at least one complete dose of Cotrimoxazole on the stock had higher odds to provide child health services than those who did not have Cotrimoxazole on the stock (AOR=1.27, 95% CI: 1.09, 1.48).

FCHVs who supported to pregnant women in ANC related activities within the last three months were two times more likely to provide child health services than those who did not support in the same activity (AOR=2.22, 95% CI: 1.72, 2.87). Likewise, FCHVs who supported PHC-ORC in the last three months were more likely to provide child health services compared to those who did not support in the similar activities (AOR=1.34, 95% CI: 1.15, 1.55). Similarly, FCHVs who conducted mothers' group meeting within the last three months had higher odds of providing child health services than those who did not conduct the mothers' group meeting in the last three months (AOR=1.66, 95% CI: 1.21, 2.2).

FCHVs who utilized money within last one year from the FCHV fund were more likely to provide child health services compared to those who did not use the money from the fund (AOR=1.31, 95% CI: 1.14, 1.51). Similarly, FCHVs who used mobile phone had higher odds to provide child health services as compared to those who did not use the mobile phone (AOR=1.64, 95% CI: 1.35, 1.98). Likewise, FCHVs who were involved in different local committees were more likely to provide the child health services than those who were not involved in such committees (AOR=1.29, 95% CI: 1.11, 1.49).

In the adjusted analysis, literacy, residence, time to reach the nearest health facility, training received, dress allowance received, incentive received other than dress allowance were not significantly associated with the child health service delivery by FCHVs (Table not shown).

Discussion

The sharp decline in child mortality in Nepal over the past few decades has been attributed to different inexpensive community-based interventions [6, 13-15] led by local health workers and FCHVs. Our study findings demonstrate that FCHVs are greatly involved in providing child health services as nearly two out of three FCHVs provided at least one child health service in the last three months prior to the survey. Studies around the world have shown that community-based interventions with minimal training to

community health volunteers and ensuring availability of life-saving key commodities have contributed to the decline in child mortality [16-19].

The availability of key commodities (Cotrimoxazole tablet, Zinc tablet and ORS) with FCHVs was associated with providing child health services in our study. Even though, FCHVs treated 853,924 cases of diarrhoea with Zinc and ORS and 277,095 cases of ARI with Cotrimoxazole in the fiscal year 2014/15 [3] the FCHV survey report 2015 [12] mentioned that the limited availability of commodities severely restricts FCHVs' ability to provide services, and deserves more attention than it currently receives. Reducing commodity stock-out rates across Nepal thus could reasonably be assumed to contribute to improved child health outcomes. Though the importance of local health workers cannot be ignored, mobilization of FCHVs have supported in bringing services closer to the community in a country which has been suffering from a chronic shortage of human resources for health. A study from Nepal[20] has however indicated that women did not prefer to contact FCHVs during the illness of their child because of their incompetency and lack of medicines. For the effectiveness of the FCHV program, their mobilization thus needs to be continuously monitored and supervised by local health workers with regular competency based training and sufficient supply of logistics.

Our study findings indicate that incentives do not affect the delivery of child health services by FCHVs. This might be because of their volunteering role and that FCHVs are motivated by social recognition which is also supported by a qualitative study done in Nepal [21]. Studies have however shown that the issue of fair compensation for FCHVs needs to be addressed [10, 21, 22] as economic insecurity is a strong barrier to volunteering. Motivational activities like the provision of FCHV's recipient status of training and dress allowance were not significant in this study. The reason might be that FCHV's had joined volunteerism with the least expectation.

The government of Nepal has created FCHV fund- a micro-credit fund which is managed by FCHVs. They use this fund in income-generating activities. Our study depicts that utilization of money from the fund was associated with child health service delivery by FCHVs. The fund might have strengthened their economic status, increased the sense of belongingness and improve their performance[10].

Our study showed a difference in child health service delivery as per caste and province which might be due to variation in literacy by district and by caste/ethnic group [12, 23]. In

our study, education of FCHVs was not significantly associated with the child health service delivery. A study from Dhanusha, Nepal[24] had however shown that the educational status of FCHVs is likely to affect their knowledge and performance on maternal and child health services.

FCHVs who supported in primary health care outreach clinics and ANC related activities were more likely to provide child health services as compared to those who did not support in these activities. Evidence-based interventions to improve child survival has been documented[19, 25] which has shown that continuum of care need to be in focus to reduce child mortality and morbidity. The key interventions include family planning, ANC, skilled attendant at birth, postnatal care for mother and newborn, vaccine and antibiotics for treatment of pneumonia. Involving FCHVs in these wide ranges of interventions would aid in the integration of maternal, child and newborn services thus leading better outcomes in human capital and development. It is however equally important to take work burden of FCHVs into consideration while task shifting and also capacitate FCHVs to deal with cultural and religious issues that surround during pregnancy and childbirth in Nepal[26, 27].

Our study showed that participation of FCHVs in health mother's group meeting was associated with the delivery of child health services. These meetings are unique platforms to discuss different health issues and are attended by local women. Studies from Nepal have shown that frequent interactions between mothers and FCHVs were related to the use of child health services from FCHVs [20] and reduction in underweight and stunting status among children[28]. Similarly, a study from Makwanpur, Nepal [29] and India[30] had shown that participatory intervention involving women's group can decrease both maternal and neonatal mortality and improve service utilization. The functionality of a mother's group meeting could thus be argued as an important intervention to improve child health in the community settings.

The use of mobile phone and wireless technology has a huge potential to improve the health and wellbeing of the resource constraint communities through communication and exchange of skills among health workers and with communities [31, 32]. The use of the mobile application to improve maternal and neonatal health outcomes has been studied among FCHVs in Nepal which have shown promising results [33, 34]. Our study findings also showed that the use of the mobile phone by FCHVs was associated with child health

service delivery indicating that a mobile phone could play a potential role to improve child health outcomes. We assume that FCHVs are likely to be contacted through mobile phone in case of emergency or other health needs by the communities leading to increased service utilization of child health services.

Our study findings demonstrated that FCHVs who were involved in the local level committees were more likely to provide child health services than those who were not involved in similar committees. RB Khatri, SR Mishra and V Khanal [35] however are of the view that the involvement of FCHVs in other non-health programs such as forest user groups, community development groups, education, and microcredit and saving groups could compromise their working hours in the health sector leading to poor performance. We maintain that such involvement may open opportunities for social networking.

Nepal is in the early stage of implementation of federalism and the constitution has identified health as a fundamental right. While the federal government is responsible for broader policy, the province and local governments are responsible to manage the health services [36, 37]. In the changed federal governance, the task of managing FCHVs comes under the direct responsibility of the local level government (municipality, rural municipality) who were previously managed by local health posts and primary health centres. The role of local level governments would thus be crucial to motivate these cadres for contributing to the health of the communities. The FCHVs are complimentary cadres to improve the health of the communities and their effort alone might not be sufficient. It is also necessary that there is increased community demand for health care and the availability of quality health services at health institutions.

This study is based on a large sample size and the findings can be generalizable to the entire country. However, there are inherent limitations of the study. Firstly, its cross-sectional study design does not allow establishing causation. Secondly, this study only focuses on the supply side (FCHV's) perspective and thus there is an indication of further research to understand the demand side perspectives. Furthermore, this study doesn't identify the main reasons for not providing or providing child health services. Future research may be needed to explore these factors in detail.

Conclusion

This study revealed that utilization of FCHV funds, availability of the essential commodities (Cotrimoxazole tablet, Zinc tablet and Oral Rehydration Salt), conduction of mothers' group meeting, involvement in local level committees and supported in other health programs are important for FCHV program in Nepal. Ensuring a sustainable means to supply these essential commodities and encouraging the involvement of FCHVs in community-based health services will thus help to improve child health status in Nepal.

Declarations

Abbreviations

AOR: Adjusted Odds Ratio; ARI: Acute Respiratory Infection; CB-IMCI: Community Based Management of Childhood Illness; CI: Confidence Interval; FCHVs: Female Community Health Volunteers; ORS: Oral Rehydration Salt; PHC/ORC: Primary Health Care Out Reach Clinic; WHO: World Health Organization

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Availability of data and materials

The data is available upon request to the corresponding author.

Author's contributions

HKB and LD conceptualized the study and monitored the survey. HKB, LD and SS performed data analysis. KR was the PI of the survey and supported to write the discussion.

HKB, VK and PK interpreted the results and wrote the discussion section. NRP supervised the study. All authors reviewed the final draft of the manuscript.

Ethics approval and consent to participate

The ethical approval for this study was obtained from the Nepal Health Research Council (Reference no: 122/2014) which is the national peak body that approves human researches and monitors such studies within the country. Written informed consent was taken from the study participants before the data collection and personal identifiers were removed during the data analysis.

Consent for publication

Not applicable

Competing interests

The authors declare that they have no competing interests.

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Tables

Table 1 Proportion of FCHVs who provided different child health services (n=4302)

| Child health services* | Percentage |
|---|-------------------|
| Diarrhoea treated with ORS | 51.6 |
| Diarrhoea treated with Zinc | 44.4 |
| Examined for a cough or cold | 44.3 |
| Treated with cotrimoxazole for possible pneumonia cases | 24.3 |
| Malnourished children counselled or referred | 9.3 |
| Provided at least one Child Health-related services | 62.6 |

*Multiple responses

Table 2 Association between socio-demographic characteristics and delivery of child health services (n=4302)

| Background characteristics | Total | Provided child health services | p value |
|-----------------------------------|--------------|---------------------------------------|----------------|
| | n (%) | % (95% CI) | |
| Age | | | |
| <25 yr | 204 (4.38) | 58.04 (52.11, 63.76) | 0.477 |
| 25-39 yr | 1735 (39.09) | 63.24 (60.15, 66.23) | |
| 40-54 yr | 1869 (43.62) | 62.84 (59.43, 66.12) | |
| 55+ yr | 494 (12.9) | 61.79 (57.96, 65.48) | |
| Literacy | | | |
| Illiterate | 708 (18.4) | 52.44 (47.67, 57.16) | 0.001 |
| Literate | 3592 (81.6) | 64.92 (62.56, 67.22) | |
| Caste | | | |
| Hill caste | 1812 (39.71) | 66.95 (64.1, 69.68) | 0.008 |
| Terai caste | 512 (14.08) | 58.17 (50.12, 65.82) | |
| Dalits | 260 (6.35) | 68.19 (60.94, 74.64) | |
| Janajatis | 1628 (37.69) | 59.49 (56.73, 62.19) | |
| Others | 90 (2.17) | 51.73 (35.72, 67.4) | |
| Residence | | | |
| Urban | 257 (0.8) | 55.66 (51, 60.21) | 0.008 |
| Rural | 4045 (99.2) | 62.71 (60.26, 65.09) | |
| Province | | | |
| 1 | 825 (17.53) | 62.36 (58.05, 66.49) | 0.001 |
| 2 | 521 (19.36) | 57.35 (51.84, 62.69) | |
| 3 | 702 (16.76) | 57.97 (55.19, 60.7) | |
| 4 | 361 (12.75) | 55.84 (50.75, 60.81) | |

| | | | |
|---------------------------------|--------------|----------------------|-------|
| 5 | 778 (14.85) | 73.12 (70.11, 75.93) | |
| 6 | 410 (9.13) | 59.87 (54.63, 64.89) | |
| 7 | 705 (9.63) | 77.48 (73.39, 81.1) | |
| Years of work experience | | | |
| < one year | 131 (3.04) | 51.4 (40.86,61.32) | <0.05 |
| 1-5 year | 733 (17.04) | 65.24 (61.45,68.84) | |
| >5 years | 3438 (79.92) | 62.56 (59.95,65.09) | |

Table 3 Association between other background characteristics and child health service delivery (n=4302)

| Characteristics | Total n (%) | Provided child health services% (95% CI) | p value |
|---|------------------------|---|---------------------|
| Use of mobile phone | | | |
| No | 727 (17.38) | 49.30 (43.34,55.27) | <0.001 [†] |
| Yes | 3575 (82.62) | 65.46 (63.31,67.54) | |
| Time to reach the nearest public health facility | | | |
| <30 min | 1462 (34.36) | 59.84 (56.25,63.32) | 0.018 [§] |
| 30-60 min | 1645 (38.1) | 64.90 (61.77,67.9) | |
| >60 min | 1195 (27.54) | 63.05 (60.81,65.24) | |
| Received basic training | | | |
| No | 195 (3.79) | 54.09 (47.99,60.07) | 0.009 [§] |
| Yes | 4107 (96.21) | 62.99 (60.42,65.48) | |
| Received dress allowance | | | |
| No | 193 (4.5) | 52.61 (46.39,58.76) | 0.008 [§] |
| Yes | 4109 | 63.12 (60.45,65.71) | |

(95.5)

**Received monetary/ non-monetary
incentive other than dress allowance**

| | | | |
|-----|-----------------|---------------------|-------|
| No | 2735 (64.18) | 61.5 (58.24,64.66) | |
| Yes | 1567 (35.82) | 64.71 (62.37,66.97) | 0.068 |

ORS in stock

| | | | |
|-----|-----------------|---------------------|--------|
| No | 986 (24.69) | 52.15 (47.52,56.74) | <0.001 |
| Yes | 3315 (75.31) | 66.1 (63.9,68.24) | |

Zinc in stock

| | | | |
|-----|-----------------|---------------------|--------|
| No | 1993 (46.62) | 54.93 (52.44,57.4) | <0.001 |
| Yes | 2308 (53.38) | 69.41 (66.74,71.95) | |

Cotrimoxazole pediatric in stock

| | | | |
|-----|-----------------|--------------------|--------|
| No | 2224 (51.47) | 56.2 (53.59,58.78) | <0.001 |
| Yes | 2077 (48.53) | 69.5 (66.7,72.16) | |

Supported in ANC services in last 3

months

| | | | |
|-----|-----------------|---------------------|---------------------|
| No | 346 (8.65) | 39.02 (32.43,46.03) | <0.001 [†] |
| Yes | 3956 (91.35) | 64.89 (62.23,67.45) | |

Provided support in PHC/ORC in the last 3 months

| | | | |
|-----|-----------------|---------------------|---------------------|
| No | 2260 (51.58) | 58.07 (55.43,60.66) | <0.001 [†] |
| Yes | 2042 (48.42) | 67.53 (65.19,69.78) | |

Supported in immunization clinic in the last 3 months

| | | | |
|-----|-----------------|---------------------|-------|
| No | 1753 (40.25) | 58.34 (55.96,60.68) | 0.913 |
| Yes | 2549 (59.75) | 65.55 (62.76,68.25) | |

Conducted health mothers group meetings in the last 3 months

| | | | |
|-----|-----------------|---------------------|---------------------|
| No | 239 (4.74) | 37.93 (30.79,45.64) | <0.001 [†] |
| Yes | 4063 (95.26) | 63.88 (61.11,66.56) | |

| Used FCHV fund | | | | |
|---|--|-----------------|---------------------|--------|
| No | | 1743 (39.96) | 58.22 (54.64,61.71) | <0.001 |
| Yes | | 2399 (60.04) | 66.38 (63.7,68.97) | |
| Involved in local committees | | | | |
| No | | 1596 (38.68) | 57.26 (53.91,60.54) | <0.001 |
| Yes | | 2706 (61.32) | 66.05 (63.85,68.18) | |
| Associated with FCHVs right based organization | | | | |
| No | | 3821 (89.98) | 61.6 (58.92,64.2) | 0.491 |
| Yes | | 481 (10.02) | 72.1266.62,77.02) | |

Table 4 Determinants of child health service delivery by FCHVs

| Characteristics | Adjusted Odds Ratio (95 % CI) |
|---|---------------------------------------|
| Caste | |
| Hill caste | 1.00 |
| Terai caste | 0.92 (0.70, 1.22) |
| Dalits | 1.28 (0.93, 1.77) |
| Janajatis | 0.92 (0.78, 1.09) |
| Muslim and tarai others | 0.52 (0.32, 0.84)** |
| Province | |
| 1 | 1.00 |
| 2 | 1.27 (0.95, 1.69) |
| 3 | 0.94 (0.75, 1.18) |
| 4 | 0.93 (0.70, 1.22) |
| 5 | 1.83 (1.43, 2.32)** |
| 6 | 0.90 (0.68, 1.19) |
| 7 | 2.45 (1.89, 3.17)** |
| ORS in stock | |
| No | 1.00 |
| Yes | 1.44 (1.22, 1.70)** |
| Zinc in stock | |
| No | 1.00 |
| Yes | 1.48 (1.27, 1.72)** |
| Cotrimoxazole Pediatric tablet in stock | |
| No | 1.00 |
| Yes | 1.27 (1.09, 1.48)* |
| Provided support in the ANC clinics in last 3 months | |
| No | 1.00 |
| Yes | 2.22 (1.72, 2.87)** |
| Provided support in PHC/ORC in the last 3 months | |
| No | 1.00 |

| | |
|---|---------------------|
| Yes | 1.34 (1.15, 1.55)** |
| Involved in mother's group meeting | |
| No | 1.00 |
| Yes | 1.66 (1.21, 2.27)** |
| Used FCHV fund | |
| No | 1.00 |
| Yes | 1.31 (1.14, 1.51)** |
| Use of mobile phone | |
| No | 1.00 |
| Yes | 1.64 (1.35, 1.98)** |
| Involved in local committees | |
| No | 1.00 |
| Yes | 1.29 (1.11, 1.49)** |

**=p<0.01, *=p<0.05; Adjusted full model