

A Survey Study on the Role of Female Community Health Volunteers (FCHVs) in Nepal, During and Following the 2015 Earthquakes.
A. Horton^{a1}, R. Chandra Silwal^b, P. Simkhada^c

^a Liverpool John Moores University, United Kingdom, L3 5UG.

Email: Amber.Horton@wales.nhs.uk

^b Country Director, Green Tara Nepal, Nepal, GPO 8974, CPC 158.

Email: rsilwal@greentara.org.np

^c Associate Dean International and Professor of Global Health, University of Huddersfield, United Kingdom, HD1 3DH. Email: P.P.Simkhada@hud.ac.uk

Address correspondence to: Amber.Horton@wales.nhs.uk

Abstract

Community Health Workers (CHWs) perform a number of different roles in public and primary health, globally. This paper explores response efforts of CHWs in disasters, using the 2015 earthquakes in Nepal as a specific case study. A survey was carried out in the Dhading District of Nepal, in collaboration with Green Tara Nepal through their Post-Disaster Health Promotion Project between March and April 2018. Female Community Health Volunteers (FCHVs) present and enrolled as a FCHV during the 2015 earthquakes, in the Dhading District were included in the study. 55 participants completed the survey questionnaire. All 55 participants reported that they provided at least one type of assistance during the earthquakes of 2015. An important finding is that 94% of participants believe further training in emergency response and preparedness would be beneficial.

Keywords: Nepal earthquake; FCHV; CHWs; disaster response; volunteers

¹ Present address: Public Health Wales, Capital Quarter 2, Tyndall Street, Cardiff, CF10 4BZ.

1 Background

Earthquakes can have devastating impacts in a matter of seconds and have accounted for an average of 27,000 deaths a year, worldwide, since the 1990's [1]. Natural disasters can have profound impact on the health and well-being of communities, the resilience and dependability of health systems, and can influence the stability of national economies [2]. Despite earthquakes occurring worldwide, there is a consensus that the impact of earthquakes is greater in low- and middle-income countries (LMICs), especially in rural areas [3]. Rural communities disproportionately suffer from a lack of and access to health services and infrastructure. Thus, with the disruption of services being a key impact of an earthquake, the already fragmented primary and mental health services, are disrupted even more in these areas [4].

Community Health Workers (CHWs) are widely operated as both small- and large-scale programs, globally. They are filling a significant gap in access to health care, especially in rural communities in LMICs [5, 6, 7]. For this reason, CHWs have become an integral part of Primary Health Care (PHC) systems, globally [6]. Previous studies have concluded that CHWs are able and willing to work during a natural disaster, however, it is noted that there are barriers to this willingness and ability to respond as a result of lack of training to respond to such events [8, 9, 10]. Despite there being previous literature on CHWs in LMICs [6, 11, 12, 13], literature is predominately focused on the CHWs in American countries or other high-income countries (HICs) [14, 15] and there appears to be little literature focusing on the role and response efforts of CHWs in natural disaster response in LMICs. This presents a gap in the knowledge base in which this paper explores.

Some CHWs are part of national scale programs that act as an integral part of the health system. The Female Community Health Volunteer (FCHV) program in Nepal is an example of a national scale program [6, 13]. Over the years, the role of FCHVs has expanded beyond the original focus of basic family planning [16] and now includes an extensive range of services under maternal and child health care [13]. This group of females currently stands at approximately 52,000 volunteers nationwide in Nepal [17] and they are based mainly in a rural setting.

Since the role of FCHVs is varied but predominantly focussed on maternal and child health, this raises the question as to how they can respond to an emergency crisis such as the 2015 earthquakes, in Nepal, through task shifting, as previously noted by Mishra et al. [7]. It is not highlighted in their 18 days of basic training, nor in the Code of Ethics for FCHVs [18] that part of their role is to respond to an emergency crisis. However, normal duties encompass promotional, preventative and curative measures of health, presenting adaptability to different situations. This is used as a foundation to look at the response efforts during the April 2015 earthquakes in Nepal.

Nepal suffered a 7.8 magnitude earthquake on April 25th 2015, with the epicentre located in the Gorkha District. Two weeks later, another earthquake, with the magnitude of 7.3, struck the country [19], with the epicentre located in the Dolakha District. These natural disasters subsequently left the country in a humanitarian crisis, with OCHA [20] reporting a total of 8,891 deaths, 22,000 injured and thousands missing as a result. The Government of Nepal (GoN) declared emergency in 14 of the 35 affected districts, hence, launched a large scale, immediate humanitarian relief response with the support of international agencies [20].

During recovery efforts, there was some criticism around the implementation of preventative and promotional health measures within communities [21]. This included criticism of

community engagement and support. This suggests that communities could have been better served, during and following the earthquakes, through community engagement and support. This raises the question as to whether FCHVs played a role in response and recovery efforts, during and following the earthquakes, and whether they could have been better equipped with skills and training.

Thus, the purpose of this study is to understand the role of FCHVs during and following the earthquakes in 2015. For the purpose of this study, the term ‘FCHV’ will be used in association with Nepal only and the term ‘CHW’ will be used for other CHWs, globally. When the Nepal earthquakes are referred to, this should be understood as both earthquakes on 25th April and 12th May 2015.

2 Methods

2.1 Study Area

The setting for this study was Nepal, with a population of approximately 29 million people. Nepal relies on large-scale programs such as the FCHVs in order to deliver basic child and maternal health to the predominantly rural areas [6, 18]. However, there is a lack of knowledge and understanding of their role to respond during disasters. Organisations such as Green Tara Nepal – a non-governmental organisation (NGO), work to improve maternal and child health care, by working with FCHVs around the country. This study works with Green Tara Nepal to extend the research as part of the Post-Disaster Health Promotion Project [22].

The study design was a small scale survey that followed a quantitative methodological approach through the use of a structured questionnaires (see appendix) that asked FCHVs to recall their response efforts during the 2015 earthquakes. FCHVs individually completed the questionnaires, with additional supervision and assistance from local health professionals.

Previous studies on CHWs in general have predominantly used qualitative methodological approaches, through the use of interviews and/or focus groups [6, 13, 23, 24]. Despite the usual use of qualitative methods to explore the roles of CHW’s, the decision to use quantitative methods proved to be best suited to this study due to time limitations, language barriers [25] and accessibility of FCHVs. Additionally, this method bridges the gap in the literature where there is a lack of quantifiable data on this topic, thus sheds light on the role of FCHVs during the 2015 earthquakes in Nepal.

The study population was FCHVs who served the Dhading district (one of the 14 districts to be declared to be ‘in an emergency’ during the 2015 earthquakes). The Dhading district is located in the central north hill region of Nepal and has a total number of 475 FCHVs as of 2015/16 [26]. Villages within this district were selected due to the regular supervision of FCHV’s by local health professionals and regularly held mothers’ group meetings; providing easy access to FCHV’s [27] through the Green Tara Post-Disaster Health Promotion Project. Villages selected were Bhumesthan, Tasarpu, Thakre, Gumdi, Dhuwakot, Sunaula Bazaar and Khalte, due to the presence of Green Tara in these villages. These villages are governed under the following rural municipalities as of September 2015; Thakre, Nilkantha and Ganga Jamuna.

2.2 Data Collection

Prior contact was made with employees of Green Tara in order to explain the research plan and prepare for data collection for the research period whereby the researcher was present in the country (March 2018). Data collection was carried out in two consecutive stages. The first stage was carried out with the researcher present in Nepal with the assistance of a graduate level Nepali-English translator. This time was limited to two weeks during March 2018.

Following this, data collection continued until the end of April 2018 with the support of two additional Green Tara employees as research assistants. Research assistants were briefed on how to carry out data collection and were supplied with all necessary materials to continue the research; this included a set of clear step-by-step instructions to follow to ensure that the data collection process followed a rigorous structure.

The sample population for this study was FCHVs who were present during the 2015 earthquakes, within Dhading. The inclusion criteria required participants to be 18 years or older and a FCHV during the 2015 earthquakes. Data was collected during the regularly held supervision meetings at different health posts located throughout the Dhading district (Bhumesthan, Tasarpu, Thakre, Gumdi, Dhuwakot, Sunaula Bazaar and Khalte). The sample for the study was selected through convenience, non-probability sampling; FCHVs who were present at the meetings, at the time of data collection. As a result, it was not possible to stratify the participants based on baseline demographics of the total population of FCHVs in Nepal. During the meetings, FCHVs were verbally briefed about the research; this included the reason for a researcher being present in the meeting and an outline of the study. This study was a voluntary study, therefore asked FCHVs present at the meeting if they would like to volunteer to complete the questionnaire for the study. The inclusion criteria was explained to FCHVs and those who wished to participate in the study, completed an anonymous questionnaire, with the assistance of the health workers and the translator, if needed (e.g. if the FCHV was illiterate). A sample size of 55 was obtained (one fifth of the FCHV population in Dhading).

Given that Green Tara staff had already previously established contact through their existing community programmes, this resulted in a good relationship within the district, between staff members, FCHVs and community health professionals. This existing relationship supported an increase in the probability of questionnaire completion, based on trust [28], and gives reason to the substantial sample size of 55 for a small scale survey study.

2.3 Data Tools

The questionnaire used was formulated by the researcher (see appendix), through the use of relevant previous research [6, 29] and assistance from Green Tara employees who had experience working with FCHVs. However, on the whole, there was a lack of quantitative methods around this research topic and a lack of previously validated questionnaires. Hence, the questionnaires were piloted by FCHVs in the Kathmandu Valley before official data collection. The questionnaires were written in Nepali, with the English translation written under each question and answer. This ensured questionnaires were simple and easy for the participants to answer, in their own language. This also took out the step of having to back-translate to English, during the data-analysis stage, which may have resulted in human error. Translation for the questionnaire was completed with support from Green Tara and a graduate level Nepali-English translator.

Questionnaires were structured and mainly consisted of closed ended, multiple choice questions. Participants were able to tick more than one answer for certain questions, where applicable. A few questions had the choice for 'Other' to be answered, with a space for the participant to write a short answer. These were kept to a minimum in order to keep the questionnaire simple and clear for the participants.

2.4 Data Analysis

All questionnaires were coded and manually entered into SPSS (Statistical Software for Social Sciences) Version 24.

For questions with a choice for ‘Other’, these responses were categorised into different options if they were frequently reported. For example, question 9 and 10 of the questionnaire asked FCHVs to state the training they received both before and after the earthquakes and had the option for ‘Other’, as the list of training stated was not extensive. The answer of ‘Mobile Medic’ was a frequent response, therefore ‘Mobile Medic’ became a category for analysis. This was applied to other frequent responses, thus, further categories were developed.

The Fisher’s Exact Test and Likelihood Ratio test was used to statistically analyse the data. Fisher’s Exact Test was used for cross-tabulation tables of 2x2 only [30, 31]. Likelihood Ratio was used for cross-tabulation tables larger than 2x2, whereby the assumptions were violated [31].

This study was approved for ethical considerations from the University Research Ethics Committee (Ref: 18/PHI/012) at Liverpool John Moores University. This study was in conjunction with Post-Disaster Health Promotion Project (Green Tara Nepal) and access to FCHVs was obtained through Green Tara contacts and the approval of gate keepers before data collection was carried out. Green Tara Nepal [22] had ethical approval from Nepal Health Research Council (Reg.no.198/2016) for their Post-Disaster Health Promotion Project.

3 Results

All data obtained from the sample was used in the results (n=55).

3.1 Baseline demographics

Data was obtained from the following health posts: Bhumesthan, Tasarpu, Thakre, Gumdi, Dhuwakot, Sunaula Bazaar and Khalte. Due to the new federal structure of Nepal, which changed in September 2015, villages have thus been re-categorised. For example, village health posts within Bhumesthan, Tasarpu, Thakre are governed by Thakre rural municipality. Dhuwakhot, Sunaula Bazaar and Khalte are now governed collectively by Nilkantha rural municipality. Gumdi village health post is now governed by Ganga Jamuna rural municipality. Therefore, these categories have been combined. Age has been recoded into two categories; 40 and below and 41 and above. These age categories were decided due to there being 49.1% of participants age 40 and under and 50.9% of FCHVs above the age of 41. The length of time working as a FCHV has also been categorised into two categories (2-10 years and 11+ years), for the same reasons. To keep in line with previous research, ethnicity was used as a baseline characteristic, however was not explored in the cross-tabulation or statistical tests due to the frequency for three of the five categories being substantially low thus would not provide meaningful analysis.

Table 1 shows the baseline demographics of the study sample.

		<i>Frequency</i>	<i>Percent of cases (%)</i>
Rural Municipality	Thakre	22	40.0
	Nilkantha	24	43.6
	Ganga Jamuna	9	16.4
Age	40 and below	27	49.1
	41 and above	28	50.9
Highest Level of Education	Illiterate	12	21.8
	Able to read and write	12	21.8
	Primary Education	11	20.0
	Completed Grade 10	13	23.6
	School Leavers Certificate	7	12.7
Ethnicity	Brahmin/Chhetri	20	36.4
	Gurung/Magar/Rai/Tamang	26	47.3
	Dalit	1	1.8
	Chepong	2	3.6
	Newar	6	10.9
Length of time working as a FCHV	2-10 years	27	49.1
	11+ years	28	50.9

Table 1 - Baseline demographics of the study sample.

3.2 Statistical analysis

This section looks at the statistical significance of the independent variables (age, level of education, length of time working as a FCHV) and the outcome variables (type of assistance provided and training received both before and after the earthquakes).

All data were nominal, categorical data, therefore cross-tabulation was used and tests for independence were performed to determine the statistical significance of the data set, between variables.

3.2.1 Assistance provided by FCHVs

Participants were able to select more than one option as an answer when asked what assistance they provided. 96.4% of participants believe that it is part of their role to respond during an emergency crisis. 100% of participants reported that they provided some sort of assistance during and following the earthquakes. First aid appears to be the most frequent response, with 90.9% of the participant’s providing this type of assistance. The least frequent type of assistance provided was a safe place for others, e.g. a home for the night. See figure.1.

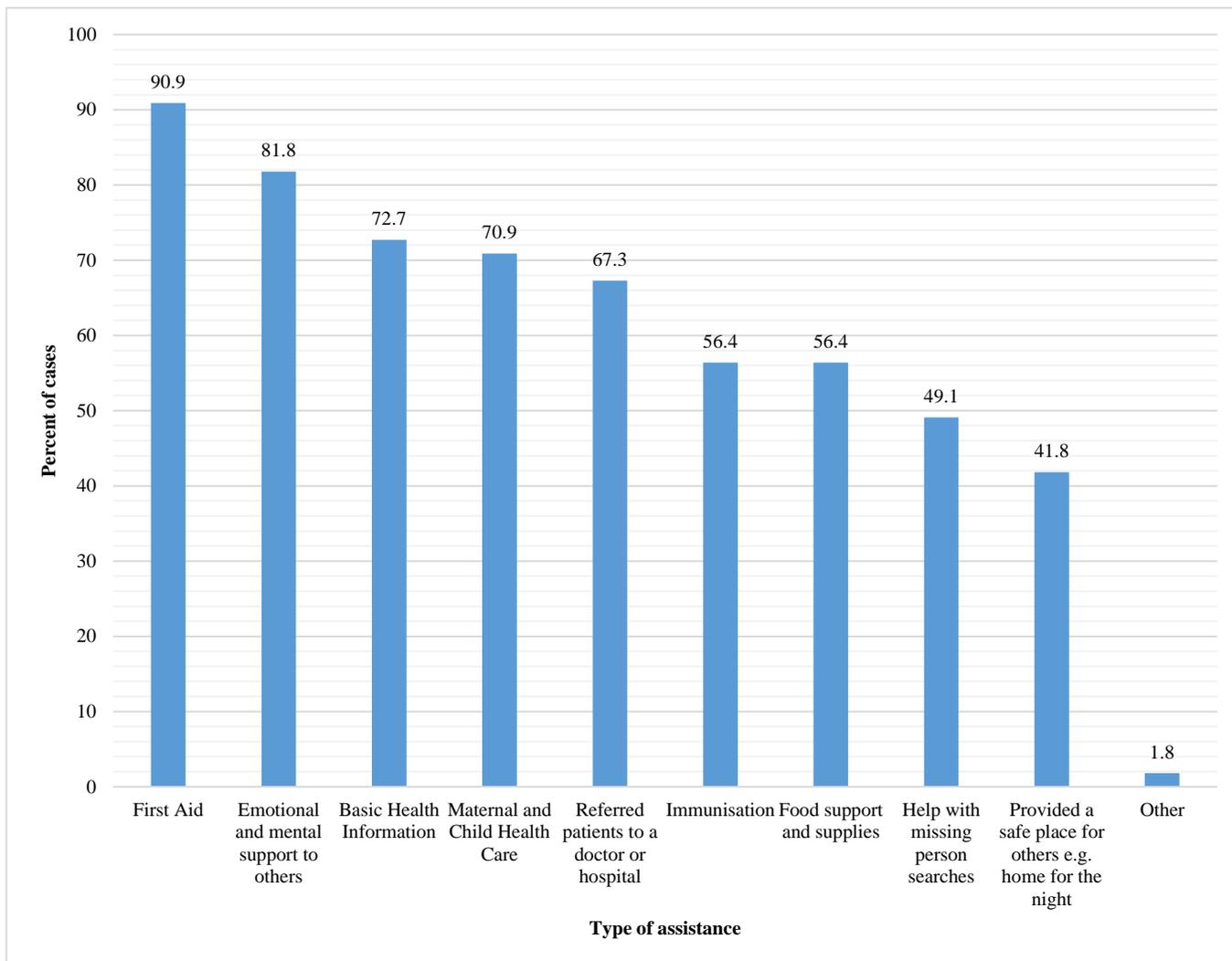


Figure 1 - Type of assistance provided by FCHVs

Table 2 represents the percent of cases that provided different types of assistance, cross-tabulated with age, highest level of educational attainment and length of time working as a FCHV. School leavers certificate, as highest level of educational attainment, cross-tabulated with missing person searches as a type of assistance provided, gave a statistically significant p-value of 0.033. All other variables, when cross-tabulated, did not calculate significant statistical findings.

Assistance Provided	Age		Highest Level of Educational Attainment					Length of time working as a FCHV	
	<i>40 and below (%)</i>	<i>41 and above (%)</i>	<i>Illiterate (%)</i>	<i>Able to read and write (%)</i>	<i>Primary Education (%)</i>	<i>Completed Grade 10 (%)</i>	<i>School Leavers Certificate (%)</i>	<i>2-10 years (%)</i>	<i>11+ years (%)</i>
First Aid	85.2	96.4	100	91.7	90.9	76.9	100	88.9	92.9
Maternal and Child Health	59.3	82.1	91.7	58.3	72.7	69.2	57.1	66.7	75.0
Provided a safe place for others	44.4	39.3	41.7	50.0	36.4	38.5	42.9	44.4	39.3
Immunisation	51.9	60.7	56.4	50.0	54.5	38.5	57.1	51.9	60.7
Food Support and Supplies	63.0	50.0	58.3	66.7	72.7	30.8	57.1	63.0	50.0
Referred patients to a doctor or hospital	70.4	64.3	75.0	58.3	72.7	61.5	71.4	66.7	67.9
Help with missing person searches	59.3	39.3	41.7	25.0	72.7	38.5	85.7	59.3	39.3
Basic Health Information	77.8	67.9	83.3	58.3	81.8	76.9	57.1	74.1	71.4
Emotional and mental support to others	74.1	89.3	91.7	91.7	81.8	69.2	71.4	77.8	81.8

Table 2 - Assistance provided by FCHVs, cross-tabulated with age, level of educational attainment and length of time working as a FCHV. Shown as a percentage. Read across then down.

3.2.2 Training

Figure 2 quantifies the different types of training received by participants before and after the earthquakes in 2015. There were 52 valid values and 3 missing values for training before the earthquakes. There was 1 missing value for training received after the earthquakes.

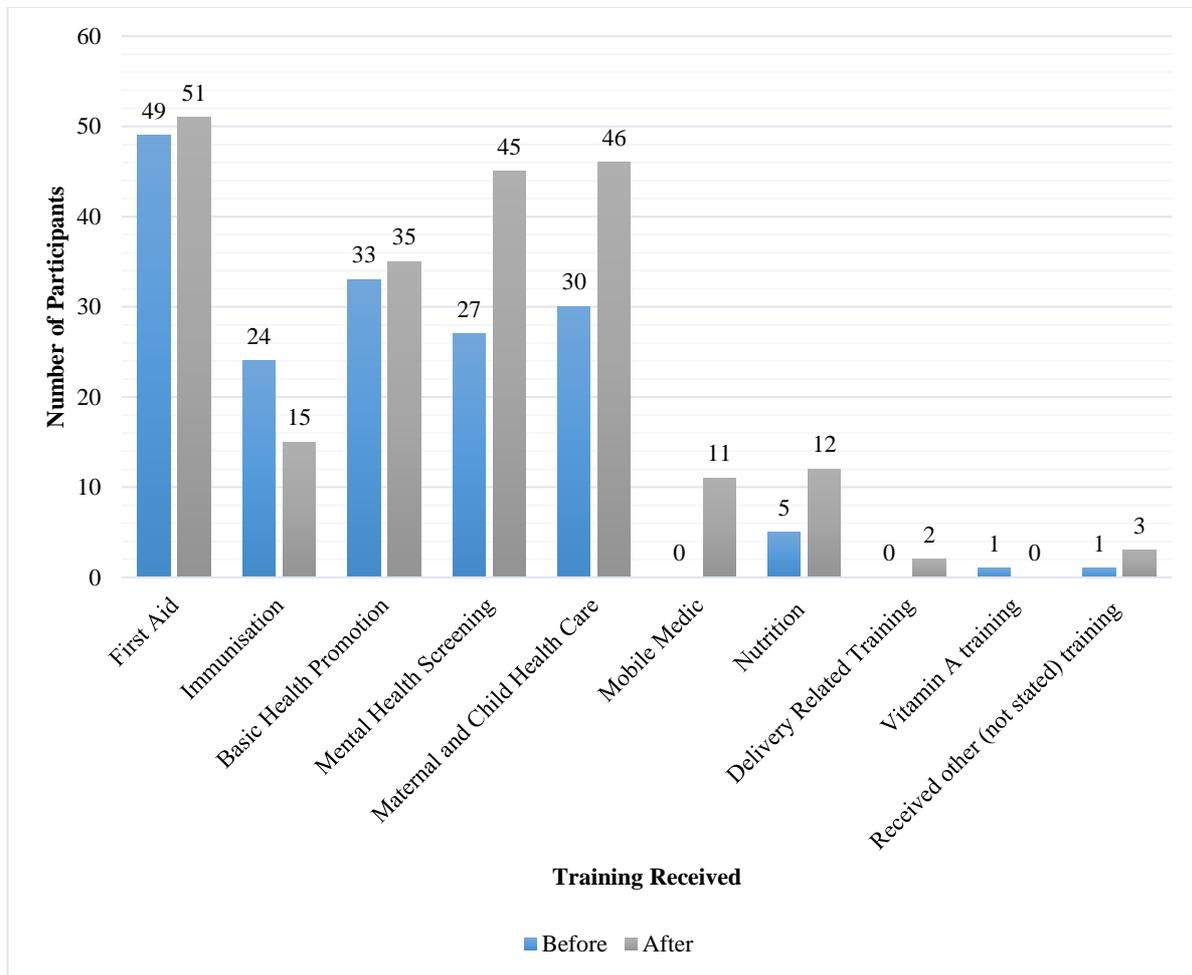


Figure 2 - Training received before and after the earthquakes.

Overall, there appears to be an increase in the training received by FCHVs. Mental Health Screening is seen to have the greatest increase in training among FCHVs, with 18 additional participants reporting to have had this training after the earthquake period. In addition, maternal and child health care training has increased greatly, with 16 participants reporting to have received this training after the earthquakes. Surprisingly, immunisation training is shown to be the only training that has not increased; training has decreased by 9 participants overall.

94% of participants believed future training around emergency preparedness would be beneficial to their role. Those who answered 'No' were asked to explain their reasoning for this answer in a blank space provided below the question, however, participants did not complete this section.

3.2.2.1 Training received before the earthquakes

The result of the Fishers Exact test was calculated to be $p=0.0004$ for the cross-tabulation between immunisation training and immunisation assistance provided and $p=0.04$ for basic health information and basic health promotion training. All other assistance provided did not show any statistical significance with the corresponding training received before the earthquakes.

Table 3 represents the percent of cases that provided different types of assistance, cross-tabulated with training received before the earthquakes, shown as a percentage.

Assistance Provided	Training Received Before the Earthquakes				
	<i>First Aid (%)</i>	<i>Maternal and Child Health Care (%)</i>	<i>Immunisation (%)</i>	<i>Basic Health Promotion (%)</i>	<i>Mental Screening (%)</i>
First Aid	91.8	-	-	-	-
Maternal and Child Health	-	80	-	-	-
Immunisation	-	-	83.3	-	-
Basic Health Information	-	-	-	87.9	-
Emotional and mental support to others	-	-	-	-	88.9

Table 3 - Assistance provided by FCHVs, cross-tabulated with corresponding training received before the earthquakes. Shown as a percentage. Read across then down.

There appears to be no statistical influential factors (age, level of educational attainment and length of time working as a FCHV) on what training was received before the earthquake (Percentages shown in Table 4).

Training Received Before the Earthquakes	Age		Highest Level of Educational Attainment					Length of time working as a FCHV	
	<i>40 and below (%)</i>	<i>41 and above (%)</i>	<i>Illiterate (%)</i>	<i>Able to read and write (%)</i>	<i>Primary Education (%)</i>	<i>Completed Grade 10 (%)</i>	<i>School Leavers Certificate (%)</i>	<i>2-10 years (%)</i>	<i>11+ years (%)</i>
First Aid	88.9	89.3	100	83.3	72.7	92.3	100	88.9	89.3
Immunisation	37.0	50.0	75.0	33.3	27.3	38.5	42.9	37.0	50.0
Basic Health Promotion	66.7	53.6	75.0	33.3	63.6	69.2	57.1	59.3	60.7
Mental Screening	40.7	57.1	58.3	58.3	45.5	38.5	42.9	51.9	46.4
Maternal and Child Health Care	55.6	53.6	50.0	58.3	54.5	53.8	57.1	55.6	53.6
Nutrition	7.4	10.7	16.7	8.3	0.00	15.4	0.00	11.1	7.1

Table 4 - Training received before the earthquakes, cross-tabulated with age, level of educational attainment and length of time working as a FCHV. Shown as a percentage. Read across then down.

3.2.2.2 Training received after the earthquakes

Table 5 shows the cross-tabulation between training received after the earthquakes and age, highest level of education and length of time working as a FCHV. This is represented as a percentage. Statistical analysis was not performed on Delivery Related training, Vitamin-A training and 'Other' training, due to the frequency within these categories being too low to perform significant statistical testing.

Both First Aid training and Mental Health Screening training showed statistical significance with the p-value of 0.039 and 0.024, respectively, when cross-tabulated with length of time working as a FCHV – those working as a FCHV for longer, attended/received these two training modules, after the earthquakes. All other training was not associated with the length of time working as a FCHV as all calculations were greater than the tabulated p-value 0.05. In addition, there appears to be no statistical association between age and level of educational attainment and the training received/attended after the earthquakes.

Training After	Age		Highest Level of Educational Attainment					Length of time working as a FCHV	
	<i>40 and below (%)</i>	<i>41 and above (%)</i>	<i>Illiterate (%)</i>	<i>Able to read and write (%)</i>	<i>Primary Education (%)</i>	<i>Completed Grade 10 (%)</i>	<i>School Leavers Certificate (%)</i>	<i>2-10 years (%)</i>	<i>11+ years (%)</i>
First Aid	92.6	92.9	91.7	91.7	90.9	100	85.7	96.3	89.3
Immunisation	22.2	32.1	50.0	8.3	18.2	38.5	14.3	22.2	32.1
Basic Health Promotion	59.3	67.9	75.0	58.3	72.7	53.8	57.1	63.0	64.3
Mental Screening	77.8	85.7	91.7	83.3	81.8	76.9	71.4	77.8	85.7
Maternal and Child Health Care	85.2	82.1	83.3	66.7	90.9	84.6	100	88.9	78.6
Mobile Medic	22.2	17.9	25.0	16.7	18.2	15.4	28.6	18.5	21.4
Nutrition	11.1	32.1	50.0	16.7	18.2	15.4	0.00	14.8	28.6

Table 5 - Training received after the earthquakes, cross-tabulated with age, level of educational attainment and length of time working as a FCHV. Shown as a percentage. Read across then down.

4 Discussion

4.1 Main findings

4.1.1 Assistance provided

It should be noted that 96.4% of participants hold the belief that it was part of their role to respond during an emergency crisis, such as the 2015 earthquakes. Thus, 100% of participants reported that they provided some sort of assistance during and following the earthquakes.

4.1.2 Factors influencing assistance provided

Highest level of educational attainment is only a significant factor of influence on the role of FCHVs during and following the earthquakes in helping with missing person searches. Both age and length of time working as a FCHV do not appear to influence the role of FCHVs during and following the earthquakes. Therefore, it can be said that there is not a strong association between factors analysed and assistance provided.

4.1.3 Training influencing response

There is a strong statistical association between both immunisation training and basic health promotion training, received before the earthquakes, pointing to the idea that training is beneficial for improved response efforts. 94% of participants believed future training on the topic of emergency preparedness would be beneficial to their role.

4.2 What is already known?

To date, there are a lack of studies presenting the response and assistance provided, and factors that may influence response, by CHWs during and following a natural disaster, globally. A number of other studies have begun to explore the training of CHWs globally. Kok et al. [11] found in their systematic review study that continuous training of CHWs can have a positive influence on their role, in terms of performance, effectiveness and motivation levels. In addition, Kalyango and colleague's study [12] compliments this by stating that training provides the ability to apply previous knowledge to a new situation, therefore improving appropriate reactions to different situations. Despite this, there appears to be a lack of literature for the training processes and supervision of CHWs, globally, including that on FCHVs [14, 32]. The Family Health Division [18] states that FCHVs have 18 days of basic training on public health concerns. However, there are no set guidelines for what exact topics are to be covered during this training, therefore this lacks transparency. In addition, FCHVs further receive refresher training [18], of which there is a training manual for [33]. However, this is only available in Nepali, therefore, it is difficult as an English researcher to interpret and understand what refresher training takes place, in order to analyse efficiently. It is stated that their role is to preserve community health and to promote health services in the community through health motivation and education to others [18]. With the health and population sector being severely impacted as a result of the earthquakes [34], preserving community health can be seen to be crucial following an earthquake, which can explain why 96.4% of FCHVs hold the belief in viewing part of their role to respond to an emergency crisis.

There is a previous lack of literature around the influence of factors such as education, age and length of time serving as a CHW and whether this influences their role within the community and the training they attend. However, a previous study [35] found that education, along with gender and ethnicity can have an impact on the way in which individuals react to situations around them.

4.3 Why this study adds value

Prior to this study, little was known about the response efforts and role of FCHVs during and following the earthquakes of 2015 in Nepal. This study eludes to the positive response of FCHVs during and following the 2015 earthquakes. With FCHVs falling into the category of CHWs, who are valued members of PHC systems globally, especially in LMICs, it is possible

to use this case study in other LMICs. Although it is not possible to measure their effect, it is possible to quantify the assistance FCHVs provided.

At the time of the earthquakes, The Ministry of Health [39] formed sub-clusters under the health cluster response, including injuries management and mental health management. This highlights the importance of both first aid and mental health screening response (the most frequently reported assistance provided by FCHVs) following an earthquake. Therefore, it should be understood that these types of assistance provided by FCHVs, fitted well into the health cluster response efforts set out by the Ministry of Health [39] and further add value in the future for policy and planning of natural disasters.

Like many other LMIC's, FCHVs as a national-scale programme, is not without challenges and suffers a lack of reported training and refresher training. However, the finding that basic health information training is beneficial to FCHVs to be able to respond and apply knowledge appropriately, which corroborates previous studies [5, 12]. These studies found that CHWs are effective in delivering health promotion interventions, especially with targeted messages, which are highlighted in prior training hence are able to adapt accordingly to a multitude of situations. Therefore, the basic health promotion training FCHVs received before the 2015 earthquakes suggests messages were made simple and concise, hence, FCHVs were able to relay information and put training into practice and adapt accordingly to the earthquakes. However, despite training to be recognised as beneficial to CHWs globally, there was some criticism with the co-ordination within communities, from a policy level. Lee [36] criticised the national response efforts following the earthquakes, despite there being clear guidelines in the *National Strategy for Disaster Risk Management* and in the *Health Sector Emergency Preparedness and Disaster Response Plan* [37, 38, 39]. In addition, Adhikari, Mishra & Raut [21] states there was a lack of community engagement and support, following the crisis. Therefore, this suggests a lack of co-ordination with those in the community that could have made a difference (FCHVs). This study adds a further dimension to previous knowledge in that training influences response, however, without appropriate community guidance and co-ordination, FCHVs may not have been able to adapt and respond as needed.

5 Limitations

A limitation of studies of this kind that adopt convenience, non-probability sampling is that it is not possible to stratify the sample with the baseline characteristics or demographics of the total population of interest. The sampling method was also based on volunteers, therefore, estimates of sampling error could not be calculated. Given the restricted accessibility of FCHVs due to the topography of Nepal and the underdeveloped infrastructure, this sampling method was best suited to the study for a higher probability of data collection. Additionally, taking a quantitative approach within this study field expands on the knowledge base around CHWs response to earthquakes, with a new methodological approach; the majority of studies on CHWs globally use a qualitative methodological approach.

The sample size of the study was $n=55$. It can be argued that statistical testing provides a greater statistical power with a larger sample size [40]. However, it is noted that a sample size of 30 or more is a good size for a small-scale survey study [41, 42]. Additionally, the statistical tests used in this study accommodate for small sample sizes and samples that violate the assumptions. Therefore, the findings of this study should still be deemed significant. Future studies should consider sampling from other districts in Nepal to represent the rural areas more sufficiently.

With the study undertaken in Nepal, a small limitation of the study was the language barrier between English and Nepali, this was recognised as a challenge rather than a barrier. Some documents such as the *FCHV Refresher Training, Facilitators Guide* [33] were only available in Nepali. Therefore, some key background information may have been missed when understanding the refresher training, as part of the discussion of results, when access to a translator was not available. However, during all data collection stages the graduate level translator and employees of Green Tara Nepal provided accurate and timely assistance for translation, ensuring all data collected was correctly analysed and interpreted due sound relationship with the translator [25].

6 Conclusions

Overall, this study has presented that all participants in the study provided assistance immediately following the 2015 earthquakes in Nepal. A crucial finding is that training positively influenced the response efforts of FCHVs, as they are better educated for an array of public health concerns, thus, are able to respond appropriately to the environment around them. Furthering this, 94% of FCHVs believed that future training on disaster preparedness and response would be beneficial for future emergency crises. Despite the role of FCHVs being voluntary, it is understood they are self-motivated members of the community that hold pride in their position [18]. Globally, CHWs have a respected position in their local communities, however, in order to be effective, they must be well-trained, well-supervised and given the supplies necessary in order to perform their duties [10].

7 Recommendations

Based on the findings of this case study, the following is recommended for CHWs in LMICs and can further be applied in HICs:

- Further the findings of this research by using a qualitative or mixed methods approach, to further understand the in-depth opinions and views of CHWs on natural disaster response as part of their role and preparedness for such situations.
- Consider the development of new training methods for CHWs that focuses on emergency response to disaster, as a public health priority. Full transparency and consistency across CHW programs should be adopted for improved uptake in training and effectiveness.
- In all CHW programs, include CHWs in decisions for further training and added work streams to their role. Additionally, encourage regular feedback from CHWs of training methods, for improved effectiveness.

Funding

This study received partial funding from Liverpool John Moores University as part of the Go Global scheme. The funding body did not have a role in the study design, data collection, analysis or interpretation of data. It did not have input in the writing of the study nor in the publication of this work.

Acknowledgements

The author would like to thank Green Tara Nepal, all participants and translators for their support, advice and guidance.

References

- [1] Guha-Sapir, D. and Vos, F. (2011). Earthquakes, an epidemiological perspective on patterns and trends. In *Human Casualties in Earthquakes* (pp. 13-24). Springer, Dordrecht.
- [2] WHO (2017). *Emergency Response Framework*. [PDF] Available at: <http://apps.who.int/iris/bitstream/handle/10665/258604/9789241512299-eng.pdf?sequence=1> [Accessed 19 March 20].
- [3] Alcantara-Ayala, I. (2002). Geomorphology, natural hazards, vulnerability and prevention of natural disasters in developing countries. *Geomorphology*, 47(2-4), pp.107-124.
- [4] Davis, J. R., Wilson, S., Brock-Martin, A., Glover, S., Svendsen, E. R. (2010). The impact of disasters on populations with health and health care disparities. *Disaster Medicine and Public Health Preparedness*, 4(1), 30–38.
- [5] Gilmore, B. and McAuliffe, E. (2013). Effectiveness of community health workers delivering preventive interventions for maternal and child health in low-and middle-income countries: a systematic review. *BMC Public Health*, 13(1), p.847.
- [6] Panday, S., Bissell, P., Teijlingen, E. and Simkhada, P. (2017). The contribution of female community health volunteers (FCHVs) to maternity care in Nepal: a qualitative study. *BMC Health Services Research*, 17(1), p.623.
- [7] Mishra, S.R., Neupane, D., Preen, D., Kallestrup, P. and Perry, H.B., 2015. Mitigation of non-communicable diseases in developing countries with community health workers. *Globalization and Health*, 11(1), p.43.
- [8] Qureshi, K.A., Merrill, J.A., Gershon, R.R. and Calero-Breckheimer, A. (2002). Emergency preparedness training for public health nurses: a pilot study. *Journal of Urban Health*, 79(3), pp.413-416.
- [9] Nicholls, K., Picou, J.S. and Lowman, J. (2014). Enhancing the Utility of Community Health Workers in Disaster Preparedness, Resiliency, and Recovery. In *International Oil Spill Conference Proceedings* (Vol. 2014, No. 1, pp. 170-183). American Petroleum Institute.
- [10] Perry, H., Zulliger, R., Scott, K., Javadi, D., Gergen, J. and Shelley, K. (2014). Case studies of large-scale community health worker programs: examples from Afghanistan, Bangladesh, Brazil, Ethiopia, India, Indonesia, Iran, Nepal, Pakistan, Rwanda, Zambia and Zimbabwe. *Developing and strengthening community health worker programs at scale: a reference guide and case studies for program managers and policymakers*. Washington (DC): USAID/MCHIP (Maternal and Child Health Integrated Program).
- [11] Kok, M.C., Dieleman, M., Taegtmeier, M., Broerse, J.E., Kane, S.S., Ormel, H., Tijm, M.M. and de Koning, K.A. (2014). Which intervention design factors influence performance of community health workers in low-and middle-income countries? A systematic review. *Health policy and planning*, 30(9), pp.1207-1227.

- [12] Kalyango, J.N., Rutebemberwa, E., Alfvén, T., Ssali, S., Peterson, S. and Karamagi, C. (2012). Performance of community health workers under integrated community case management of childhood illnesses in eastern Uganda. *Malaria Journal*, 11(1), p.282.
- [13] Panday, S., Bissell, P., Van Teijlingen, E. and Simkhada, P. (2019). Perceived barriers to accessing Female Community Health Volunteers (FCHV) services among ethnic minority women in Nepal: A qualitative study. *PloS one*, 14(6).
- [14] O'Brien, M.J., Squires, A.P., Bixby, R.A. and Larson, S.C. (2009). Role development of community health workers: an examination of selection and training processes in the intervention literature. *American Journal of Preventive Medicine*, 37(6), pp.S262-S269.
- [15] Swider, S.M. (2002). Outcome effectiveness of community health workers: an integrative literature review. *Public Health Nursing*, 19(1), pp.11-20.
- [16] Khatri, R.B., Mishra, S.R. and Khanal, V. (2017). Female community health volunteers in community-based health programs of Nepal: future perspective. *Frontiers in public health*, 5, p.181.
- [17] Glenton, Scheel, Pradhan, Lewin, Hodgins, & Shrestha. (2010). The Female Community Health Volunteer programme in Nepal: Decision makers' perceptions of volunteerism, payment and other incentives. *Social Science & Medicine*, 70(12), pp. 1920-1927.
- [18] Family Health Division. (2016). *FCHV*. [online] Fhd.gov.np. Available at: <http://www.fhd.gov.np/index.php/en/2014-03-21-09-41-44/fchv> [Accessed 19 Jul. 2018].
- [19] WHO. (2015). *Humanitarian crisis after the Nepal earthquakes 2015*. [PDF] Nepal. Available at: http://www.searo.who.int/entity/emergencies/phra_nepal_may2015.pdf?ua=1 [Accessed 31 May 2018].
- [20] OCHA. (2015). *Nepal Earthquake Humanitarian Response April to September 2015*. [PDF] OCHA. Available at: https://reliefweb.int/sites/reliefweb.int/files/resources/nepal_earthquake_humanitarian_response_report_lr.pdf [Accessed 31 May 2018].
- [21] Adhikari, B., Mishra, S.R. and Raut, S. (2016). Rebuilding earthquake struck Nepal through community engagement. *Frontiers in Public Health*, 4, p.121.
- [22] Green Tara Nepal. (2016). *Green Tara Nepal » PDHP / Post-Disaster Health Promotion Project, Dhading*. [online] Greentara.org.np. Available at: <http://greentara.org.np/portfolio/pdhp-post-disaster-health-promotion-project-dhading/> [Accessed 24 Jan. 2020].
- [23] Feldhaus, I., Silverman, M., Lefevre, A., Mpembeni, R., Mosha, I., Chitama, D., . . . George, A. (2015). Equally able, but unequally accepted: Gender differentials and experiences of community health volunteers promoting maternal, newborn, and child health in Morogoro Region, Tanzania. *International Journal for Equity in Health*, 14(1), 70.

- [24] Fredricks, K. F., Dinh, H. D., Burke, T. M., Nelson, B., Kusi, M., Yogal, C., & Karmacharya, B. (2017). Community Health Workers and Disasters: Lessons Learned from the 2015 Earthquake in Nepal. *Prehospital and Disaster Medicine*, 32(6), 1-6.
- [25] Pitchforth, E. and Van Teijlingen, E., 2005. International public health research involving interpreters: a case study from Bangladesh. *BMC Public Health*, 5(1), p.71.
- [26] DoHS. (2017). *Annual Report - Department of Health Services. (2015/16)*. 1st ed. [PDF] Kathmandu. Available at: http://dohs.gov.np/wp-content/uploads/2017/06/DoHS_Annual_Report_2072_73.pdf [Accessed 6 Jan. 2018].
- [27] DoHS. (2015). *Annual Report - Department of Health Services. (2013/14)*. 1st ed. [PDF] Kathmandu. Available at: http://dohs.gov.np/wp-content/uploads/2014/04/Annual_Report_2070_71.pdf [Accessed 6 Jan. 2018].
- [28] Kane, E. and O'Reilly-de Brún, M. (2001). *Doing your own research*. Marion Boyars.
- [29] Fathima, F., Raju, M., Varadharajan, K., Krishnamurthy, A., Ananthkumar, S., & Mony, P. (2015). Assessment of 'Accredited Social Health Activists'-A National Community Health Volunteer Scheme in Karnataka State, India. *Journal of Health Population And Nutrition*, 33(1), 137-145.
- [30] ASK Brunel (2013). *Chi-square test in SPSS + interpretation*. [online] YouTube. Available at: <https://www.youtube.com/watch?v=wflfEWMJY3s> [Accessed 25 Jul. 2018].
- [31] Piereira, C. (2015). *Chi-squared test and interpretation using SPSS (assumptions violated)*. [online] YouTube. Available at: <https://www.youtube.com/watch?v=-qcIVHECqco> [Accessed 25 Jul. 2018].
- [32] Valley Research Group. (2006). *A Study on the FCHV Endowment Fund*. [PDF] Kathmandu: Valley Research Group. Available at: http://nfhp.jsi.com/Res/Docs/fchv_endow_fund.pdf [Accessed 1 Aug. 2018].
- [33] USAID. (2012). *FCHV Refresher Training, Facilitators Guide - Nepali*. [PDF] Kathmandu: USAID. Available at: <http://www.nfnsp.gov.np/PublicationFiles/d6645ceb-a965-4d62-a40f-27afc20629b6.pdf> [Accessed 23 Jul. 2018].
- [34] Government of Nepal. (2015). *Post Disaster Needs Assessment. Vol. A: Key Findings*. [PDF] Kathmandu: Government of Nepal. Available at: https://www.npc.gov.np/images/category/PDNA_Volume_A.pdf [Accessed 11 Jun. 2018].
- [35] Schmitt, M., Behner, R., Montada, L., Müller, L. and Müller-Fohrbrodt, G. (2000). Gender, ethnicity, and education as privileges: Exploring the generalizability of the existential guilt reaction. *Social Justice Research*, 13(4), pp.313-337.
- [36] Lee, A.C.K. (2016). Barriers to evidence-based disaster management in Nepal: a qualitative study. *Public health*, 133, pp.99-106.
- [37] Centre for Excellence in Disaster Management & Humanitarian Assistance (2017). *Nepal Disaster Management Reference Handbook*. [PDF] Center for Excellence in Disaster

Management & Humanitarian Assistance. Available at: <https://www.cfdmha.org/LinkClick.aspx?fileticket=xEUbtKHdfR4%3D&portalid=0> [Accessed 17 Jun. 2018].

[38] Government of Nepal. (2008). *National Strategy on Disaster Risk Management*. [PDF] Kathmandu. Available at: <http://www.nrccs.org/sites/default/files/prodoc/NSDRM%20Nepal.pdf> [Accessed 17 Jun. 2018].

[39] Ministry of Health (2003). *Health Sector Emergency Preparedness & Disaster Response Plan Nepal*. [PDF] Kathmandu: Ministry of Health. Available at: <http://www.eird.org/isdr-biblio/PDF/Health%20sector%20emergency%20preparedness.pdf> [Accessed 15 Jun. 2018].

[40] Scott, I. and Mazhindu, D. (2014) *Statistics for Health Care Professionals – An Introduction*. London: Sage.

[41] Denscombe, M. (2014). *The good research guide for small scale research projects* (Fifth ed., Open UP study skills). Maidenhead: Open University Press.

[42] Sue, V.M and Ritter, L.A. (2012). *Conducting Online Surveys*. 2nd ed. Los Angeles: Sage.

Appendix
Questionnaire used for survey

(See PDF)