



Performance of Community Health and Nutrition Volunteers and Associated Factors in Hajjah, Yemen

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ABSTRACT

Background: since the Community Health and Nutrition Volunteers (CHNVs) program established, the performance of CHNVs has never been evaluated.

Aims: to evaluate the performance of the CHNVs, and its associated factors.

Methods: a cross-sectional study design was conducted in Bani Qais and Al-Maghrabah districts, Hajjah governorate between January and April 2023. Odds ratios with 95% confidence intervals (CI) were calculated. A p-value < 0.05 was considered statistically significant.

Results: A total of 65 CHNVs participated in this study. Almost 53.8% of CHNVs had-high performance, 29.2% had moderate performance, and 16.9% had low performance level.

The multivariate regression analysis of factors associated with the performance of CHNVs revealed that the percentage of CHNVs who were involved in an occupation was high-performance compared to those not involved in any occupation (68.8% vs 39.4%). This association was statistically significant [adjusted odds ratio (aOR) = 10.8, 95% CI: 1.1-105.9, p value = 0.041].

Moreover, the percentage of CHNVs who serve 22 or less children under 24 months old was high-performance compared to those serving more than 22 children under 24 months old (69.7% vs 37.5%). This association was statistically significant (aOR = 7.9, 95% CI: 1.2 - 51.5, p value = 0.031).

Conclusions: the performance of CHNVs is inadequate. The main job and number of children under 24 months served were significantly affected the performance of CHNVs.

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1. Introduction:

Community health workers (CHWs) programs are crucial, especially in resource-limited countries, due to growing evidence of their effectiveness in delivering quality healthcare and improving population health [1]. Community health and nutrition volunteers

(CHNVs) is one of the terms used to describe the CHWs. The most frequently adopted definition of CHNVs by WHO in 1987 was any lay health workers who live in the area they serve, are primarily based in the community (as opposed to a health facility), belong to the formal health system, perform tasks related to health care

delivery, and have received organized training but may not have received formal or paraprofessional certification or a tertiary education degree [2].

In developing countries, improvement in the health situation of rural communities has been rare due to the unfair allocation of health care services to urban areas. The provision of basic health services to rural communities is essential for achieving health-related Millennium Development Goals [3]. Community participation is a strategy that encourages people to take part in solving their own problems. CHWs have been used to encourage community participation, enhance the work of health authorities, and increase the coverage of essential health interventions [4].

The geographical terrain is the main challenge facing the Yemeni health system. About 70% of the population lives in rural areas scattered across high mountains and deserts in spaced and scattered clusters. Consequently, the access of the population to PHC services is more difficult, particularly for mothers and children under 5 years. The Ministry of Public Health and Population (MPHP) has actively strived to enhance and expand healthcare services, aiming to ensure accessibility for all citizens at all times. Therefore, the establishment of the CHNVs program is one of the solutions to address the health problems among children and women in rural areas [5].

The CHNVs Program is an extension of the Community Based Nutrition (CBN) Program, launched by the MPHP during 2003-2005 as a component of the Child Development Project. The project was designed and implemented by the United Nations International Children's Emergency Fund and its national partners, with the support of the World Bank. The CBN sub-component started in August 2003 in five districts. It expanded to five more districts in June 2004 to cover 244 villages in 10 districts with 371 volunteers [6].

In 2006, the MPHP decided to develop the program to add other PHC services to the nutrition services provided by the volunteers and

changed it into the CHNVs program as one of the components of the Health System Strengthening Program. The number of CHNVs increased to 918 in 35 districts in 2010. The deployed CHNVs were gradually increased from 2,503 in 2013 to 25,352 in 2019, to cover 243 districts in 21 governorates [5].

The aim of the program is to contribute to reducing morbidity and mortality among pregnant and lactating mothers, and children by improving maternal and child health. It provides PHC services to pregnant and lactating mothers, children under 5 years, and youths at age 10-19 years who live in the villages of the 2nd and 3rd levels of the health facility catchment areas, where 47% of the population lives [5, 7].

Many published studies have used different methods to assess the performance of volunteers and its associated factors. These studies have focused on elements that affect volunteers' performance, such as sociodemographic and work profile, incentives, supervision, and training. The studies aimed to assess factors affecting the performance of volunteers in Uganda [8, 9, 10], Kenya [11, 12, 13, 14, 15, 16, 17], Ghana [18], Cameroon [19], Nepal [20], Zambia [21], Lao People's Democratic Republic [3, 22], India [23], Thailand [24], and Malaysia [25].

Despite the expansion of the CHNVs program to cover most of the governorates in recent years, the performance of CHNVs and the factors that influence their performance have never been evaluated. The need for such an evaluation has become crucial in learning more about the CHNVs program and providing valuable information to the MPHP officials and partners. However, this study aimed to assess the performance of the CHNVs and determine the associated factors influencing their performance.

2. Materials and methods

2.1. Study design, area and population

A cross-sectional study design was conducted among the CHNVs in Bani-Qais and Al-Maghrabah districts, Hajjah governorate,

Yemen. from January to April 2023. Hajjah governorate has the highest number of CHNVs compared to other Yemen governorates, with 1,912 active CHNVs [26].

2.2. Sample size and sampling technique

A sample size of CHNVs was considered to be half of the active CHNVs in each district (35 CHNVs from Al-Maghrabah district and 33 CHNVs from Bani-Qais district). They were selected from 30 villages from each district which was considered as a minimum statistical number and sufficient to estimate the quantitative variables. A two-stage sampling method was used. The first stage was used to select districts. The districts of Hajjah governorate were divided into lowland and highland districts and arranged alphabetically. random sampling method was used to select one lowland (Bani-Qais) and one highland (Al-Maghrabah) district. The second stage was used to select CHNVs. From each district, a random sampling method was used to select half of the active CHNVs from 30 villages.

2.3. Data collection

A pre-tested structured questionnaire has been adopted from standardized questionnaires and previous literature [9, 18, 27, 28, 29, 30]. The questionnaire included questions to elicit information about the characteristics of the CHNVs (age, marital status, education, main job and residence), work profile of the CHNVs (years of experience as volunteers, time taken to the farthest household and from the village to the health facility, working days per month and working hours in a day), population coverage (number of households served, and number of children under 5 years and children under 24 months covered), and other variables related to the CHNV program components (training, supervision, meetings and population coverage). After consent was obtained from participants, face-to-face interviews were used to collect data. Moreover, a desk review of the records and reports of CHNVs was used to collect data on the performance of the CHNVs. The performance of

the CHNVs was evaluated based on the following 7 activities, which were carried out during the month prior to the data collection period:

1. Assessment of the nutritional status of children,
2. Assessment of the nutritional status of mothers,
3. Growth monitoring of children,
4. Providing health and nutrition education,
5. Providing counseling services,
6. Documentation of the activities provided in the record, and
7. Submit the monthly report to the supervisor.

The previous seven activities were selected to assess the performance of CHNVs because they are the main activities that CHNVs are expected to perform monthly. However, the other activities were excluded from evaluation because some activities required supplies or drugs that were not always available to most CHNVs and reported in most of the monthly reports of 2022, such as providing oral rehydration solution sachets and zinc, deworming tablets, iron, and folic acid tablets. Other activities aren't usually performed by all CHNVs, such as testing/treatment of malaria cases, referring/follow-up the detected malnutrition cases. Similarly, most CHNVs did not perform the activity of supporting other PHC programs, such as immunization activities.

2.4. Data analysis and interpretation

SPSS 26 was used for data entry and analysis. Almost all the data of the quantitative variables were not normally distributed, as determined by the Shapiro-Wilk test (p value < 0.05). However, the data were presented in median and interquartile range (IQR) as quartiles 1 and 3. The frequency and percentage were used for categorical variables.

To estimate the CHNVs' performance, a total score for all 7 activities was calculated for each CHNV. The median was used as a cutoff point to categorize performance levels [10, 22, 25]. As a result of the median performance score of 6, which represents 86%, the performance level

was categorized as high (if they performed 6 or more activities), moderate (if they performed 4 or 5 activities), or low (if they performed 3 or fewer activities).

Unadjusted and adjusted odds ratios with a 95% confidence interval (CI) were calculated to assess the association between the CHNVs' performance and independent variables using multinomial logistic regression. The median was used as the cutoff point for categorizing the quantitative variables. All variables with a p value < 0.2 from the bivariate analysis were entered into the multivariate logistic regression analysis. Low performance was considered the reference category in the multinomial logistic regression analysis. A p-value < 0.05 was considered statistically significant.

2.5. Ethical consideration

This study is part of research conducted and submitted for the partial fulfillment of the requirements for the degree of Doctorate of Public Health. It was approved by the Research

and Ethics Committee of the Faculty of Medicine and Health Science, Sana'a University. Official letters to conduct this study were sent to the MPHP and the Public Health and Population Offices of Hajjah governorate. The aim of the study was explained to all study participants. Informed consent was obtained from all participants. Confidentiality of data was assured and ensured.

3. Results

A total of 65 CHNVs participated in this study, with 32 CHNVs from Al-Maghrabah (highland) district with a response rate of 91% and 33 CHNVs from Bani-Qais (lowland) district with a response rate of 100%.

1. Characteristics of the CHNVs

In both districts, the majority of CHNVs were aged between 25 and 34 years (56.9%), married in both districts (64.6%), had a secondary school education (72.3%), and farming (38.5%) (table 1).

Table 1: Distribution of community health and nutrition volunteers by socio-demographic characteristics in Al-Maghrabah and Bani-Qais districts, Hajjah governorate, 2023

Characteristics	Al-Maghrabah (highland) (n = 32)	Bani-Qais (lowland) (n = 33)	Total (n = 65)
	no (%)	no (%)	no (%)
Age group (years):			
20 - 24 years	7 (21.9)	14 (42.4)	21 (32.3)
25 - 34 years	22 (68.8)	15 (45.5)	37 (56.9)
≥ 35 years	3 (9.3)	4 (12.1)	7 (10.8)
Marital status:			
Single	12 (37.5)	9 (27.3)	21 (32.3)
Married	19 (59.4)	23 (69.7)	42 (64.6)
Widowed	1 (3.1)	1 (3.0)	2 (3.1)
Education attainment:			
Basic school (1-9 years)	2 (6.2)	4 (12.1)	6 (9.2)
Secondary school (10-12 years)	24 (75.0)	23 (69.7)	47 (72.3)
Higher (≥12 years)	6 (18.8)	6 (18.2)	12 (18.5)
Main job: ^a			
Farming	22 (68.8)	3 (9.1)	25 (38.5)
Teaching	3 (9.3)	1 (3.0)	4 (6.2)
Not involved in any occupation	7 (21.9)	26 (78.8)	33 (50.8)
Others ^b	0 (0.0)	3 (9.1)	3 (4.5)
Residence of volunteers:			
Lives in the village	24 (75.0)	27 (81.8)	51 (78.5)
Lives outside the village	8 (25.0)	6 (18.2)	14 (21.5)

^a the income generating occupation/activities, ^b include those who are dressmaker and health worker, IQR: Interquartile range

2. The performance level of the CHNVs

Overall, 53.8% of CHNVs had high performance, 29.2% had moderate performance, and 16.9% had low performance level. In Al-Maghrabah district, 62.5% of CHNVs had high performance, 34.4% had moderate performance,

and 3.1% had low performance. In Bani-Qais district, 45.5% of CHNVs had high performance, 29.2% had moderate performance, and 16.9% had low performance (table 2).

Table 2: Distribution of community health and nutrition volunteers by performance level in Al-Maghrabah and Bani-Qais districts, Hajjah governorate, 2023

Performance level	Al-Maghrabah (highland)	Bani-Qais (lowland)	Total
	no (%)	no (%)	no (%)
High performance (≥ 6 activities)	20 (62.5%)	15 (45.5)	35 (53.8)
Moderate performance (4-5 activities)	11 (34.4)	8 (24.2)	19 (29.2)
Low performance (≤ 3 activities)	1 (3.1)	10 (30.3)	11 (16.9)
Total	32 (100.0)	33 (100.0)	65 (100.0)

3. The associated factors influencing the performance of CHNVs

Results of the bivariate analysis indicated that the CHNVs who were involved in any occupation had significantly higher odds of being in the high-performance level than those who were not involved in any occupation [crude odds ratio (cOR) = 16.9, 95% CI: 1.9-147.8, p value = 0.011]. Moreover, the CHNVs who served 22 or less children under 24 months old had significantly higher odds of being in the high-

performance level than the CHNVs who served more than 22 children under 24 months old (cOR = 8.6, 95% CI: 1.6-46.5, p value = 0.012). The CHNVs who received ongoing training or attended 2 or more training sessions had significantly higher odds of being in the high-performance level than the CHNVs who didn't receive ongoing training or attended only 1 training session (cOR = 6.1, 95% CI: 1.1-33.6, p value = 0.038) (table 3).

Table 3: The bivariate logistic regression for association of variables with performance of community health and nutrition volunteers in Hajjah governorate, 2023

Variables	Performance level			High performance		Moderate performance	
	High (n= 35)	Moderate (n= 19)	Low ^a (n= 11)	cOR (95% CI)	P value	cOR (95% CI)	P value
	no (%)	no (%)	no (%)				
Socio-demographic factors:							
> 25 years of age	19 (59.4)	10 (31.3)	3 (9.4)	3.2 (0.7 – 13.9)	0.128	3.0 (0.6 – 14.7)	0.184
Married	23 (54.8)	14 (33.3)	5 (11.9)	2.3 (0.6 – 9.1)	0.236	3.4 (0.7 – 16.1)	0.129
Secondary school or higher education	32 (54.2)	18 (30.5)	9 (15.3)	2.4 (0.3 – 16.4)	0.382	4.0 (0.3 – 50.2)	0.283
Involved in occupation	22 (68.8)	9 (28.1)	1 (3.1)	16.9 (1.9 – 147.8)	0.011	9.0 (0.95 – 84.9)	0.055
Lives in the village	31 (60.8)	13 (25.5)	7 (13.7)	4.4 (0.9 – 22.2)	0.070	1.2 (0.3 – 5.9)	0.789
Work profile factors:							
> 4.9 years of experience	17 (58.6)	9 (31.0)	3 (10.3)	2.5 (0.6 – 11.1)	0.222	2.4 (0.5 – 11.9)	0.285
≤ 30 minutes the farthest household	27 (54.0)	14 (28.0)	9 (18.0)	0.8 (0.1 – 4.2)	0.744	0.6 (0.1 – 3.9)	0.614
≤ 60 minutes from village to health facility	25 (61.0)	8 (19.5)	8 (19.5)	0.9 (0.2 – 4.3)	0.934	0.3 (0.1 – 1.4)	0.114
> 5 working days per month	15 (51.7)	10 (34.5)	4 (13.8)	1.3 (0.3 – 5.3)	0.703	1.9 (0.4 – 8.9)	0.392
> 2.5 working hours per day	16 (66.7)	6 (25.0)	2 (8.3)	3.7 (0.7 – 20.1)	0.118	2.1 (0.3 – 12.7)	0.429
Population coverage factors:							
≤ 45 households covered	20 (58.8)	11 (32.4)	3 (8.8)	3.6 (0.8 – 15.7)	0.094	3.7 (0.7 – 18.3)	0.114

≤ 47 under 5 children covered	20 (60.6)	6 (18.2)	7 (21.2)	0.8 (0.2 – 3.1)	0.703	0.3 (0.1 – 1.3)	0.095
≤ 22 under 24 months covered	23 (69.7)	8 (24.2)	2 (6.1)	8.6 (1.6 – 46.5)	0.012	3.3 (0.6 – 19.5)	0.192
Training, supervision and meeting factors:							
Received ongoing training	32 (60.4)	14 (26.4)	7 (13.2)	6.1 (1.1 – 33.6)	0.038	1.6 (0.3 – 7.9)	0.564
≥ 2 training sessions attended	32 (60.4)	14 (26.4)	7 (13.2)	6.1 (1.1 – 33.6)	0.038	1.6 (0.3 – 7.9)	0.564
Received supervision	22 (56.4)	11 (28.2)	6 (15.4)	1.4 (0.4 – 5.6)	0.623	1.2 (0.3 – 5.1)	0.858
Meeting attended	10 (45.5)	6 (27.3)	6 (27.3)	0.3 (0.1 – 1.4)	0.123	0.4 (0.1 – 1.8)	0.221
^a Reference category is low performance level, cOR: Crude odds ratio, CI: Confidence interval							

The multivariate regression analysis of factors associated with the performance of CHNVs indicated that there was a statistical difference between main job and number of children under 24 months served by CHNVs, and

higher performance level of CHNVs (adjusted odds ratio (aOR) = 10.8, 95% CI: 1.1-105.9, p value = 0.041) and (aOR = 7.9, 95% CI: 1.2 - 51.5, p value = 0.031), respectively (table 4).

Table 4: Multivariate regression for association of variables with the performance of community health and nutrition volunteers in Hajjah governorate, 2023

Variables	Performance level			High performance		Moderate performance	
	High (n= 35)	Moderate (n= 19)	Low ^a (n= 11)	aOR (95% CI)	P value	aOR (95% CI)	P value
	no (%)	no (%)	no (%)				
Main job:							
Involved in occupation	22 (68.8)	9 (28.1)	1 (3.1)	10.8 (1.1 - 105.9)	0.041	8.0 (0.8 - 82.2)	0.080
Not involved in any occupation	13 (39.4)	10 (30.3)	10 (30.3)	Ref		Ref	
Resident of the volunteers:							
Lives in the village	31 (60.8)	13 (25.5)	7 (13.7)	3.1 (0.4 - 27.6)	0.305	0.9 (0.1 - 6.4)	0.917
Lives outside the village	4 (28.6)	6 (42.9)	4 (28.6)	Ref		Ref	
Working hours per day:							
> 2.5 hours per day	16 (66.7)	6 (25.0)	2 (8.3)	6.2 (0.9 - 44.4)	0.071	2.2 (0.3 - 15.1)	0.424
≤ 2.5 hours per day	19 (46.3)	13 (31.7)	9 (22.0)	Ref		Ref	
No. of children under 24 months covered:							
≤ 22 under 24 months	23 (69.7)	8 (24.2)	2 (6.1)	7.9 (1.2 - 51.5)	0.031	3.0 (0.5 - 19.6)	0.258
> 22 under 24 months	12 (37.5)	11 (34.4)	9 (28.1)	Ref		Ref	
Received ongoing training:							
Yes	32 (60.4)	14 (26.4)	7 (13.2)	3.5 (0.4 - 33.5)	0.286	1.0 (0.1 - 7.3)	0.997
No	3 (25.0)	5 (41.7)	4 (33.3)	Ref		Ref	
^a Reference category is low performance level. aOR: Adjusted odds ratio, CI: Confidence interval							

4. Discussion

The CHNV program provides PHC services to mothers and their children who live in the villages of the 2nd or 3rd levels of the health facility catchment areas. The study aimed to assess CHNVs performance, and identify the associated factors influencing their performance. It revealed that about half of CHNVs had high performance. It also found that the main job and number of children under 24 months old served by CHNVs were significantly associated with the performance of CHNVs.

The findings of this study showed that the CHNVs were mostly young, married, had a secondary school education, farmers and lived in the same village where they served. This could be attributed to the fact that CHNVs met the selection criteria of the MPHP, which are preferred married, at least 18 years of age, residents of the community to serve, and at least able to read and write fluently, with advanced educational levels being preferred [5].

Our finding is consistent with previous evaluation in Yemen, which found that the majority of volunteers were young or in their twenties [7]. Many previous studies indicated

that the majority of volunteers are married [8, 10, 11, 12, 13, 14, 15, 17, 18, 24, 25, 29, 31, 32]. However, an evaluation in Yemen found that only 9% are married [7]. Moreover, previous studies found that the majority of volunteers had secondary school or higher education [7, 8, 10, 11, 13, 15, 16, 17, 20, 25, 31, 32, 33]. In contrast, some studies indicated that the majority of volunteers had primary school education [3, 9, 14, 18, 22, 24, 28]. Additionally, previous studies found that the majority of volunteers worked in farming [3, 9, 10, 13, 15, 17, 18, 22, 24, 31]. Conversely, other studies reported that the majority of volunteers worked in jobs other than farming, such as volunteer [14] or housewives [25]. A previous study in Nepal found that the majority of volunteers lived in the same village where they worked [29].

Regarding the performance of the CHNVs, our study revealed that slightly more than half of CHNVs had high performance and close to one third of CHNVs had moderate performance in Al-Maghrabah and Bani-Qais districts. The performance level of CHNVs in our study is higher than that reported in previous studies in Uganda [9, 10], Ghana [18], Cameroon [19], and the Lao People's Democratic Republic [22]. In contrast, the level of performance of volunteers in our study is lower than that reported in earlier studies conducted in Kenya [12, 13], Thailand [24], Malaysia [25], and Madagascar [28]. Another study in Zambia found that the poor performance of CHWs was confirmed [21]. This could be attributed to the fact that CHNVs receive low financial incentives, a lack of non-financial incentives, infrequent attendance of periodic meetings, less frequent supportive supervisory visits, and limited ongoing training received by CHNVs. Additionally, the low level of data quality and documentation in terms of documentation in growth monitoring cards and the completeness of the reports may affect their performance. However, these areas need to be addressed to improve the performance level of CHNVs. Previous studies in Kenya [15] and Malaysia [25] suggest that CHNVs are not being

provided with enough supplies for their activities, which may affect their performance. Regarding the socio-demographic factors, our results found that a strong significant association was observed between the main job and the higher performance level of CHNVs (p value = 0.011). This means that CHNVs who are involved in an occupation are 16.9 times more likely to have high performance than those who are not involved in an occupation. This is likely because CHNVs who are involved in an occupation have more opportunities to develop their skills and knowledge, which can lead to better performance. Moreover, CHNVs who are involved in an occupation are 9.0 times more likely to have moderate performance level than those who are not involved in an occupation, but this association is not statistically significant (p value = 0.055). Our result agrees with many previous studies, which found that the main occupation or income generation is significantly associated with the higher performance of volunteers [15, 18, 24]. However, our result disagrees with the results of previous studies [9, 10, 12]. Moreover, CHNVs who live in the village where they work are 4.4 times more likely to have high performance levels than those who live outside the village where they work, but this difference is not large enough to be considered statistically significant (p value = 0.070). Our study is dissimilar to previous studies [20, 23]. Conversely, there are no statistically significant associations between performance level and age, marital status, or education of CHNVs (all p values > 0.05). Our findings are consistent with those of previous studies, which reported that age [3, 8, 9, 10, 13, 14, 18, 22, 24], married [8, 12, 13, 14, 15, 17, 18, 24], and secondary school or higher education [9, 12, 14, 17, 24] aren't significantly associated with the performance of volunteers. In contrast, other previous studies showed that age [11, 12, 15, 19, 20, 25], married [10, 25], and secondary school or higher education [3, 8, 10, 11, 13, 15, 18, 20, 22, 23, 25, 28] are significantly associated with the performance of volunteers.

The results of our study indicated that there aren't significant associations between all work profile factors and the performance level of CHNVs (all p values > 0.05). It is possible that CHNVs with more than 4.9 years of experience and who work more than 2.5 hours per day are more likely to be high or moderate performers than those with 4.9 years or less of experience and who work 2.5 or less hours per day. This is because they have had more time to learn and develop their skills, and more hours of work. Our results are similar to those of previous studies, which reported that the experience of volunteers [3, 10, 20] and the distance between villages and health centers [3, 22] are not significantly associated with the performance level of volunteers. Conversely, the association is found in previous studies between the performance level of volunteers and the experience of volunteers [11, 17, 24] and the number of hours worked as a volunteer per week [28].

Finding of the current study indicated that there is a statistically significant association between the number of children under 24 months old served and the performance level. This means that CHNVs who serve 22 or less children under 24 months old are 8.6 times more likely to have high performance and 3.3 times more likely to have moderate performance level than CHNVs who serve more than 22 children under 24 months old. This association is statistically significant for high performance (p value = 0.012), but not for moderate performance (p value = 0.192). On the other hand, CHNVs who serve more than 22 children under 24 months old require more time and effort to reach each child. This would be an overload, which could lead to decreased performance. However, our study agrees with previous studies, which found that there is no significant association between the number of households served and the performance level of volunteers [10, 12, 13, 24], but the association is found in previous studies [8, 9, 14].

Results of our study indicated that there is a significant association between receiving ongoing training or attending two or more

training sessions and a higher performance level of CHNVs (p value = 0.038). This means that CHNVs who received ongoing training or attended 2 or more training sessions are 6.1 times more likely to have high performance level than CHNVs who didn't receive ongoing training or attended only 1 training session. This suggests that ongoing training can help to improve the skills, knowledge, and confidence of CHNVs, which can lead to better performance. Our findings are consistent with the findings of earlier studies, which reported that training [15, 34], attending refresher training [28], or the number of training sessions attended [3, 9, 22] are associated factors for high performance. However, other studies reported that training [16, 24] or refresher training [14, 17] did not have effect on the performance of volunteers. Our findings agree with the findings of earlier studies, which found that there is no significant association between supervision visits and the performance level of volunteers [10, 16, 21, 24]. Conversely, other studies reported that supervision visits [14, 15, 23, 25, 28, 34] or meetings attended [8] are associated factors for high performance. However, regular supervision and meetings are important for CHNVs because it help them receive feedback, receive coaching, solve problems, develop skills, conduct data reviews, and provide high-quality services to the community.

The lack of a significant association between age, marital status, education level and resident of CHNVs, work profiles, supervision visits and meetings attended, and performance level might be due to the sample size in this study was not large enough to detect a significant association. Additionally, the study used self-reported data, which may be subject to bias. Moreover, the possibility that the quality of supervision and meetings was poor.

Furthermore, some of the abovementioned significant risk factors identified in bivariate analysis remain significant in multivariate regression analysis, e.g., the main job and the number of children under 24 months served by CHNVs.

The study had some limitations. First, our study had a relatively small sample size, which may have affected the likelihood of detecting a statistically significant difference. Secondly, the study was conducted in a single governorate, which may limit the generalizability of the findings. Third, the study used self-reported data, which may be subject to bias.

5. Conclusion

The study concludes that the performance of CHNVs is inadequate, as only half of CHNVs achieved a high-performance level, while the others demonstrated low or moderate performance. It also found important gaps that need to be addressed to improve CHNVs performance. These include inadequate ongoing training received by CHNVs, infrequent attendance of periodic meetings and less frequent supportive supervisory visits. Moreover, the associated factors that significantly affect the performance of CHNVs were the main job, the number of children under 24 months served, and receiving ongoing training or attending two or more training sessions. Additionally, other possible factors that may contribute to the effect on the performance of CHNVs include age, education, residents of CHNVs, years of experience, and working hours per day.

6. Recommendations

Some specific improvements are recommended to improve the performance of CHNVs:

1. Ongoing training is essential for CHNVs to develop their skills and knowledge.
2. Periodic meetings and regular supportive supervisory visits are very important for monitoring and supporting CHNVs.
3. Future research should use a larger sample size of CHNVs and expand to other settings to increase the likelihood of detecting statistically significant differences and to determine whether the findings of this study are generalizable.

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