

Performance of Community Health Workers for Water Quality, Hygiene, and Sanitation of Households in the Comè-Bopa-GrandPopo-Houéyogbé Health Zone in Benin

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Abstract

Objectives: This study aimed to measure the performance of community health workers in carrying out activities for water quality, hygiene, and sanitation in the Comè-Bopa-Grand-Popo-Houéyogbé health zone in Benin.

Methods: A cross-sectional analytical survey was conducted among 640 randomly selected households and 160 community health workers (CHW) covering these households. Data collection was carried out through interviews and observations, questionnaire, and observation grid. Statistical analysis was carried out using SPSS 21.0 for a descriptive analysis of sociodemographic, health, and environmental variables. **Results:** The results show that 95.5% of households were aware of the CHW, and 89.5% had received a visit in the last three months. The main actions of the CHW concerned hygiene (85.2%), malaria control (68.9%), and vaccination (46.9%). The performance of the CHW, assessed in 160 of them, was considered acceptable in 50.6% of cases, poor in 43.1%, and good in only 6.3%. Analysis of associated factors shows that training on the activity package was significantly linked to better performance of community health workers (OR = 2.5; 95% CI: 1.1 - 7.0; p = 0.03). **Conclusions:** The study highlights a positive impact of CHW on the adoption of good hygiene and disease prevention practices. However, efforts are still needed to strengthen their logistical support and increase awareness of water treatment and sanitation. Although CHW improve hygiene practices, their effectiveness remains limited. Strengthening training and logistical support is crucial to maximizing their impact.

Keywords

Community Health Workers, Hygiene, Sanitation, Drinking Water, Satisfaction, Benin

1. Introduction

Community health workers play a key role in improving water quality, hygiene, and sanitation in Benin, particularly in the health zones of Comè, Bopa, Grand-Popo, and Houéyogbé. This area, which has a population of around 450,000, faces major challenges related to access to drinking water and sanitation, with an estimated water access rate of around 60% and limited access to adequate sanitation infrastructure [1] [2]. These local actors are at the heart of national strategies aimed at promoting public health and the well-being of populations. The National Hygiene and Sanitation Policy of Benin highlights the importance of networks of artisans and community health workers to sustain hygiene actions. These health workers are responsible for promoting hygiene through awareness-raising actions, while craftsmen, particularly masons, carry out the necessary works, such as the construction of latrines and the installation of handwashing facilities [3]. In addition, the National Community Health Policy has led to the establishment of Qualified Community Health Agents (ASCQ), who work in synergy with community health workers to ensure the prevention of diseases linked to unsanitary water and reinforce good hygiene practices [4]. The health zone of Comè, Bopa, Grand-Popo, and Houéyogbé is crossed by the Couffo and Sazué rivers, constituting crucial water sources for local communities [5]. However, these resources are often exposed to risks of pollution, aggravated by the absence of treatment systems and the use of unprotected surface water. Community health workers intervene through awareness campaigns on domestic water treatment (use of Aquatabs, filters) and on sanitation practices, basic services, such as household waste disposal and latrine maintenance [1]. According to the WHO, improving water and sanitation infrastructure in rural areas can reduce the incidence of diarrheal diseases by 40%. [6] [7]. To achieve this goal, community health workers collaborate with organizations such as the United Nations Children's Fund (UNICEF), the World Bank, and local NGOs to ensure the distribution of hygiene kits, household monitoring, and health education among the population.

Thus, the community health workers of the Comè-Bopa-Grand-Popo-Houéyogbé health zone play a decisive role in promoting water quality, hygiene, and sanitation. This study, therefore, aims to measure the performance of the health workers in relation to the activities they carry out.

2. Materials and Methods

2.1. Study Framework

This study took place in the health zone of Comè, Bopa, Grand-Popo, and

Houéyogbé. It covers an area of 1120 km² and is located in the department of Mono [8].

2.2. Type of Study

This was a cross-sectional survey, conducted among beneficiary households in the health zone of Comè, Bopa, Grand-Popo, and Houéyogbé.

2.3. Sampling

The primary target of the study was community health workers, and the secondary target was households. The performance of health workers was measured based on information provided by households.

The probabilistic method with the cluster random sampling technique was used. The clusters were thus the 4 municipalities of the health zone. The sample size was calculated using the Schwartz formula adjusted with the cluster effect k :

$n = k Z_{\alpha}^2 \frac{pq}{i^2}$ where n is the sample size, p is the theoretical percentage of good

performance among CHWs ($p = 50\%$), q is the theoretical percentage of poor performance, Z_{α}^2 is the Z score for the confidence level (95%) (here $Z_{\alpha}^2 = 1.96$), k is the cluster effect ($k = 1.5$) and i the margin of error ($i = 5\%$) [9]. This calculation made it possible to estimate a minimum size, giving 636 households (578 with a 10% increase) or 160 households per municipality.

Each CHW in the health zone is responsible for a defined catchment area covering approximately 4 households. Thus, the 640 households surveyed corresponded to the catchment areas of 160 CHWs, who were all systematically included in the study.

3. Data Collection and Analysis

The main variable was the performance of the Community Health Workers based on household satisfaction with the activities of the CHW as well as the evaluation of the activities carried out by the CHW. These activities included: home visits by the CHW, the organization of educational talks, and awareness-raising on hygiene, sanitation, and water issues. This performance was evaluated based on the score obtained by the criteria. Each of these criteria had a binary rating (0/1) for binary variables and up to 4 for ordinal variables. The total score was 26, so performance was poor for a score below 16/26, acceptable for a score between 16/26 and 21/26, and good for a score above 21/26 (Varkevisser scale). [10]). The criteria cover domains such as frequency of home visits, quality of health education sessions, accuracy of information provided, follow-up of households, promotion of hygiene and sanitation practices, and community satisfaction. Each criterion is scored from 0 to 1 (binary) or up to 4 (ordinal), giving a maximum of 26 points.

The independent variables included sociodemographic, economic, health, and environmental characteristics of households. The performance assessments of community health workers (CHW), collected from each household, were aggregated

to obtain an average performance score per CHW. For each CHW, the performance scores reported by the households under his/her responsibility were averaged to obtain a single mean score per CHW. This aggregated score was then used to classify the CHW as poor, acceptable, or good. This average performance was equally used to identify individual or contextual factors associated with better performance. Data were collected through interviews and observations using a questionnaire and an observation grid. The analysis was done using SPSS version 21.0. Quantitative variables were described with the parameters of central tendency (mean, median) and dispersion (standard deviation), and qualitative variables with numbers and relative frequencies.

4. Results

4.1. Sociodemographic and Health Characteristics of Households

We worked on 640 people, composed of 65.6% women and 34.4% men. The sex ratio female/male was therefore 1.9. The most represented age groups were those of [25 to 40[years with 45.9% and [40 to 60[years with 42.8%. In terms of education, 29.7% of respondents have no level of education, while 44.4% have a primary level and 21.9% a secondary level. In terms of religion, the population is mainly Christian (47.7%) and animist (46.7%), reflecting the cultural and spiritual diversity of the area. The vast majority of respondents (76.4%) live in common-law unions, while 31.9% are traders and 25% are artisans. Analysis of disease-related outcomes among children under 5 years of age over the past two weeks revealed that 91.7% of households reported that no child under 5 years of age had suffered from diarrhea, while 6.6% reported one case and 1.7% reported two cases. Regarding fever, 87.2% of households did not observe any cases, but 10.6% reported a sick child and 2.2% reported at least two children affected. For cough, 87.5% of households observed no cases, while 9.7% reported a sick child and 2.8% reported at least two cases (**Table 1**).

Table 1. Distribution of households according to hygiene conditions (Comè-Bopa-Grand-Popo-Houéyogbé health zone, 2024).

	Workforce (n = 640)	%
Age (years)		
<25	25	3.9
[25 - 40[	294	45.9
[40 - 60[	274	42.8
60 years and over	47	7.3
Sex		
Female	420	65.6
Male	220	34.4
Educational level		

Continued

None	190	29.7
Literate	12	1.9
Primary	284	44.4
Secondary	140	21.9
University	14	2.2
Religion		
None	31	4.8
Christian	305	47.7
Muslim	4	0.6
Traditional	299	46.7
Other	1	0.2
Marital status		
Bachelor	10	1.6
Married	105	16.4
Divorced	5	0.8
Free union	489	76.4
Widow(er)	31	4.8
Occupation		
Civil servant/state agent	10	1.6
Artisan	160	25.0
Trader/Reseller	204	31.9
Housewife	163	25.5
Farmer/Breeder/Fisherman	68	10.6
Others	35	5.5
Diarrhea in children under 5 (last 2 weeks)		
0	587	91.7
1	42	6.6
2	11	1.7
Fever in children under 5 (past 2 weeks)		
0	558	87.2
1	68	10.6
2	13	2.0
3	1	0.2
Cough in children under 5 (last 2 weeks)		
0	560	87.5
1	62	9.7
2	15	2.3
3	3	0.5

4.2. Hygiene and Sanitation Conditions

Access to drinking water remains a major challenge as 31.6% of households obtained their water from wells, some of which were unprotected (23.6%). In addition, 33.3% used a borehole and 30.9% a pump, but 78.9% did not have water available directly at home, forcing them to travel long distances. Only 19.1% of households treated their water before consumption, and the majority used Aquatabs tablets (69.7%). Three out of 10 households did not have latrines (29.4%), which still leads to open defecation (14.4%). Among those with latrines, 53.8% were considered dirty. Handwashing facilities were absent in 87.2% of households. The study also shows that 91.9% of households did not have a bin, and 22.2% threw their waste in the open air (**Table 2**).

Table 2. Distribution of households according to hygiene conditions (Comè-Bopa-Grand-Popo-Houéyogbé health zone, 2024).

	Workforce (n = 640)	%
Water supply source		
Drilling	213	33.3
Lagoon	27	4.2
Pump	198	30.9
Well	202	31.6
Distance between source and house (n = 505)		
<500 m	178	35.2
500 m - 1 km	243	48.1
>1 km	84	16.6
Water treatment methods (n = 122)		
Aquatabs Tablet	85	69.7
Boiling water	2	1.6
Water filter	21	17.2
Other	14	11.5
Toilets		
In the open air/in the bush	92	14.4
Burial	95	14.8
Public latrine	40	6.3
Neighbors' latrine	109	17.0
Latrine in the house	304	47.6
Household waste treatment		
Burn	413	64.5
Burial	58	9.1
Throw into the open air.	142	22.2
NGO	9	1.4
Others	18	2.8

4.3. Role of Community Health Workers in Improving Hygiene and Sanitation

Almost all (95.5%) households were able to recognize their community relay, and 89.5% reported having received a visit from them in the last three months.

The topics covered during the visits mainly included:

- 1) Water, hygiene, and sanitation (85.2%).
- 2) Malaria and LLINs (68.9%).
- 3) Childhood vaccination (46.9%).

The CHW action appeared effective in promoting good practices, with educational sessions reaching a large number of households (78.3% participated).

The main hygiene awareness topics were: Environmental sanitation (89.7% of households); Drinking water consumption (80.5%); Use of latrines (72.9%); Hand washing facilities (69.3%) (**Table 3**).

Table 3. Distribution of households according to services benefiting from the CHW (health zone Comè-Bopa-Grand-Popo-Houéyogbé, 2024).

	Workforce (n = 640)	%
Knowledge of a CHW in your locality		
No	29	4.5
Yes	611	95.5
Visit to a CHW in the last three months		
No	67	10.5
Yes	573	89.5
Topics covered (n = 573)		
Personal subject	61	10.6
Breastfeeding	253	44.2
Water, hygiene, and sanitation	488	85.2
Malaria and LLINs	395	68.9
Childhood vaccination	269	46.9
Others	9	1.6
Topics covered on water, hygiene, and sanitation (n = 573)		
Drinking water consumption	461	80.5
Use of latrines	418	72.9
Environmental health	514	89.7
Hand washing device	397	69.3
Other	4	0.7
Organization of awareness sessions by the local CHW		
No	90	14.1

Continued

Yes	550	85.9
Attended an educational session within the past three months.		
No	139	21.7
Yes	501	78.3
Themes developed by the CHW		
Malaria	135	21.1
Diarrheal diseases	135	21.1
Exclusive breastfeeding	167	26.1
Water, hygiene, and sanitation	368	57.5
Respiratory infection	91	14.2
Individual hygiene	302	47.2
Waste management	297	46.4
Involvement in the choice of CHW		
No	20	69.0
Yes	9	31.0
Assessment of the choice of CHW		
Bad	16	2.5
Acceptable	225	35.2
Good	399	62.3
Suggestions		
None	462	72.2
Provision of material, financial, and logistical resources to the CHW	82	12.8
Improve the living and working conditions of the CHW.	8	1.3
Improve PEC for children under 5	26	4.1
Encouragement and recognition	16	2.5
Train the CHW	18	2.8
Force the CHW to do its job.	8	1.3
Raising awareness among the population	4	0.6
Strengthen home visits	7	1.1
Other suggestions	9	1.4

4.4. Satisfaction with the Services Offered by Community Health Workers

The choice of CHW was considered “good” by 62.3% of households; “acceptable” by 35.2% of households and “bad” by 2.5%. Furthermore, the services offered were

considered good by 56.7%, acceptable by 40.9%, and bad by 2.3% (**Figure 1**). However, 72.2% of respondents did not make any suggestions for improvement. The main recommendations concerned the provision of material and financial resources (12.8%), the improvement of the living and working conditions of CHWs (1.3%), and the strengthening of care for children under 5 years old (4.1%) (**Table 3**).

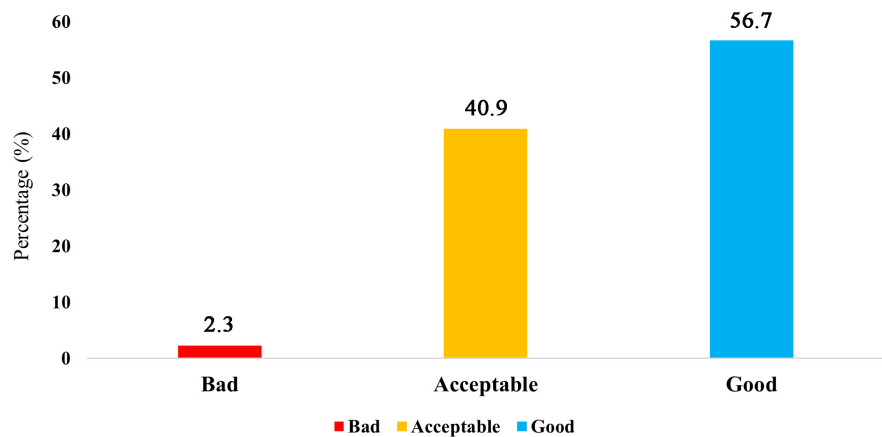


Figure 1. Distribution of households according to their assessment of CHW activities (Comè-Bopa-Grand-Popo-Houéyogbé health zone, 2024).

4.5. Sociodemographic Characteristics and Performance of Community Health Workers

The community health workers (CHW) were predominantly male (71.3%) and aged 25 to 45 years (80%). Most of the CHWs had a secondary education (71.3%) and lived in a common-law relationship (78.1%). In addition, 85% had received training on the activity package (**Table 4**, part A).

Of the 160 CHWs, 43.1% had poor performance; 50.6% had acceptable performance; and 6.3% had good performance. Furthermore, regarding the factors associated with the performance of community health workers, no significant association was revealed with sex, age, level of education, or marital status. However, trained CHWs were 2.5 times more likely to have good performance than untrained ones (OR = 2.5; 95% CI: [1.1 - 7.0]; $p = 0.03$) (**Table 4**, part B).

Table 4. Characteristics and performance of CHWs (Comè-Bopa-Grand-Popo-Houéyogbé health zone, 2024), Part A. Sociodemographic characteristics; Part B. Factors associated with CHW performance.

Part A. Sociodemographic characteristics		
	Workforce (n = 640)	%
Sex		
Female	46	28.8
Male	114	71.3
Age (years)		

Continued

[25 - 35]	69	43.1
[35 - 45]	59	36.9
[45 - 55]	23	14.4
55 and over	9	5.6
Educational level		
Primary	27	16.9
Secondary	114	71.3
University	19	11.9
Marital status		
Bachelor	4	2.5
Married	30	18.8
Free union	125	78.1
Training on the activity package		
Yes	136	85.0
No	24	15.0
CHW Performance		
Weak	69	43.1
Acceptable	81	50.6
Good	10	6.3

Part B. Factors associated with CHW performance

N=160	CHW Performance		OR (95% CI)	p-value
	Good	Bad		
Sex				0.50
Male	39	75	1	
Female	19	27	1.4 (0.7 - 2.7)	
Age				0.30
[25 - 35]	16	35	1	
[35 - 45]	28	44	1.4 (0.7 - 3.0)	
[45 - 55]	9	18	1.1 (0.4 - 3.0)	
55 years and older	5	5	2.2 (0.6 - 8.6)	
Educational level				0.35
Primary	12	15	1	
Secondary	39	75	0.7 (0.3 - 1.5)	
University	7	12	0.7 (0.2 - 2.4)	
Marital status				0.22
Bachelor	3	2	2.9 (0.5 - 18.4)	
Bride)	13	17	1.5 (0.7 - 3.4)	

Continued

Free union	42	83	1
Training on the activity package			0.03*
Yes	82	54	2.5 (1.1 - 7.0)
No	9	15	1

5. Discussion

Community health workers (CHW) play a central role in improving water quality, hygiene, and sanitation in the health zone of Comè, Bopa, Grand-Popo, and Houéyogbé. The analysis of the results of this study highlights several strengths and some limitations that deserve to be discussed in comparison with other scientific works.

5.1. Involvement of Community Health Workers and Awareness Raising

The high proportion of households aware of the CHWs (95.5%) and having received their visit (89.5%) demonstrates their active engagement in the community. These results are consistent with those of the study by Watson *et al.*, which highlighted that community interventions increase the adoption of good hygiene practices and reduce the prevalence of diarrheal diseases in low-and middle-income countries [11]. Furthermore, a study by Fewtrell *et al.* showed that awareness programs conducted by community agents contribute to a significant reduction in health risks related to contaminated water [12].

5.2. Access to Drinking Water and Adoption of Good Practices

Only 19.1% of households treat their water before consumption, a proportion lower than the WHO recommendations, which advocate widespread adoption of household water treatment methods to reduce diarrheal diseases [6]. This is probably due to the low level of education among individuals in this context. A study conducted in several developing countries shows that the use of Aquatabs tablets and water filters can significantly improve the quality of drinking water and reduce cases of diarrhea by 30 to 50% [13]. However, the adoption of these practices is often limited by lack of awareness and the costs associated with water treatment products. Although we hypothesized that education level influences water treatment practices, this relationship was not formally tested in our analysis and should be considered a limitation of the study.

5.3. Hygiene and Sanitation

The lack of latrines in 29.4% of households and the practice of open defecation (14.4%) remain major problems in the study area because the lack of sanitation infrastructure contributes to the transmission of waterborne diseases and increases child morbidity [14]. A study conducted by Clasen *et al.* (2015) demonstrated that the installation of latrines reduces the prevalence of diarrheal diseases in children

under five by 27% [15]. Furthermore, the low presence of handwashing facilities (87.2% of households) is a major concern, knowing that handwashing with soap can reduce enteric infections by 40% [16] [17].

5.4. Impact of Community Health Workers on the Reduction of Diarrheal Diseases

Analysis of data on the prevalence of diarrheal diseases in children under five years of age shows a relatively low prevalence (6.6% of households report a case). This reduced prevalence could be explained by the impact of awareness raising and CHW interventions. These results are similar to those reported by Cha *et al.*, who found that community-based water, hygiene, and sanitation interventions reduced the incidence of diarrheal diseases by 20% - 50% depending on the context [18].

5.5. Satisfaction with the Services Offered by Community Health Workers

The household satisfaction assessment shows that the CHW services are generally considered acceptable. However, suggestions for improvement mainly concern the insufficient material and financial resources allocated to the CHW (12.8%), a problem also identified by a study conducted in Uganda, which showed that the lack of resources limits the effectiveness of community initiatives [19].

The fact that households mainly requested additional material and financial resources highlights the need for program managers and policymakers to strengthen logistical support and provide incentives for CHWs. Without adequate resources, their capacity to promote hygiene and sanitation remains limited, which could compromise the sustainability of community health interventions.

5.6. Performance of Community Health Workers

In addition, the study assessed the performance of community health workers based on intervention, satisfaction, and perceived quality criteria. It emerged that less than 10% of the CHWs had a performance deemed “good,” while 43.1% had poor performance. This finding highlights the need to strengthen the skills of these actors. Analysis of factors associated with the performance of the CHWs showed that training on the activity package is the only statistically significant element ($p = 0.03$), doubling the chances of obtaining good performance ($OR = 2.5$). These results corroborate those of previous studies demonstrating the positive impact of continuous training on the effectiveness of community interventions [6] [20]. It therefore appears essential to invest more in capacity building to improve the results of the CHWs on the ground.

In summary, this study demonstrates that community health workers are well integrated into their communities and contribute positively to improving hygiene and sanitation practices. However, their overall performance remains limited, with training emerging as the only factor significantly associated with better outcomes. Strengthening capacity building and logistical support, therefore, appears essential to optimize the contribution of CHWs to public health in Benin.

6. Conclusion

This study confirms the positive impact of community health workers on improving hygiene and sanitation conditions in the health zone of Comè, Bopa, Grand-Popo, and Houéyogbé. However, further efforts are needed to strengthen their capacity for action, particularly by providing these actors with sufficient resources and promoting more integrated intervention strategies which could include combining WASH messages with maternal and child health consultations, or linking hygiene promotion with malaria prevention campaigns (e.g., distribution of LLINs together with Aquatabs and handwashing demonstrations). It is also crucial to intensify awareness-raising on domestic water treatment and the use of handwashing devices in order to maximize the impact of community interventions on reducing waterborne diseases. Furthermore, the evaluation of their performance showed that only a minority reach an optimal level, highlighting the importance of regular strengthening of the technical capacities of community health workers through targeted training and local support.

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Conflicts of Interest

The authors have no conflicts of interest associated with the material presented in this paper.

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