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Long Paper

Awareness and Practices of Barangay Health Workers to Waterborne Diseases: Basis for a Proposed Capability Training Plan

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Abstract

Barangay health workers (BHWs) play an important role in every community health care delivery system. They act as frontliners under the primary health care approach. They render primary care services such as first aid and maternal, neonatal, and community-based interventions in the community. This study generally aimed to determine the awareness and practices of barangay health workers regarding waterborne diseases: basis for a proposed capability-training plan. Survey questionnaires were used as the primary tool. A total citation was attempted among the BHWs, whereas systematic random sampling was done for the BHWs, resulting in 60 barangay health worker respondents. The findings of the study showed that BHWs serve more than 15-20 households. The motivator factor is more important to BHWs' work performance than hygienic issues. The majority of the barangay health stations must have the essential equipment, instruments, and supplies to provide health care services. However, water, sanitation, and hygiene facilities need to be enhanced. The BHWs are not fully equipped personally with the paraphernalia needed for delivering community services. The schedule of health services is dependent on the midwife. Local policies relative to BHWs are limited. The work environment can be more favorable if BHWs are equipped personally with the resources necessary to provide quality services and if the inadequacy of clean water, sanitation, and hygiene facilities is addressed. Moreover, the functionality of the barangay health station must be maintained. The BHWs Benefit and

Incentive Act (RA 7883) must be properly implemented to sustain BHWs' motivation for better work performance.

Keywords – awareness, practices, barangay health workers, waterborne diseases, training

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INTRODUCTION

Countries worldwide face a broad and highly diverse range of health threats, including infectious disease outbreaks, unsafe food and water, chemical and radiation contamination, natural and technological hazards, wars and societal conflicts, and the health consequences of climate change (World Health Organization [WHO], 2014). Massive amounts of suffering are brought about by these events, and many aspects of people's lives are impacted, including their access to food, water, and other necessities of life as well as their health, security, and housing. Therefore, having emergency plans in place is essential. Countries are urged to improve their emergency risk management capabilities by implementing measures for prevention, mitigation, preparedness, response, and recovery to help meet these challenges, according to an assessment commissioned by the UN United Nations Cultural Scientific and Cultural Organization (UNESCO, 2007).

As the lead agency for addressing the health aspects of emergency preparedness and response with the World Health Assembly in 2005, the WHO passed a resolution calling on the organizations to provide technical guidance and support to countries building their emergency response capabilities, stressing a multi-sectorial and comprehensive approach. The following year (2006), another resolution called on member states to further strengthen and integrate their response program, especially at the community level (WHO, 2008).

Natural disasters are catastrophic atmospheric, geologic, and hydrologic events, including earthquakes, volcanic eruptions, landslides, tsunamis, floods, and droughts. These events have a fast or gradual onset with adverse effects on one's health, society, and economy, and deaths are associated with natural disasters; a remarkably rapid onset is overwhelming. Conversely, communicable disease mortality following a natural disaster is less frequent (Watson et al., 2006).

Furthermore, flooding is the most common natural disaster in developed and developing countries. It severely affects environmental sanitation and may spread contaminants over the flooded areas, which deteriorates the drinking water supply and living conditions. Flooding is linked to an increased risk of infection. This risk is minimal unless there is a significant population shift or water supply disruption (WHO, 2007). Waterborne illnesses like cholera, leptospirosis, hepatitis A, and typhoid fever may spread more readily. A water-related communicable disease associated with population displacement leading to the scarcity of safe water causes diarrheal disease outbreaks (Wingard & Brandlin, 2013).

LITERATURE REVIEW

The community-based health workforce comprises all those at the community level who can contribute to promoting health by providing preventive and promotional health care. Barangay health workers (BHWs) are trained volunteers and social mobilizers of community-based organizations that promote health through behavior change communications, health education, and social mobilization, as well as actors from key sectors such as water sanitation, and hygiene, agriculture, food security, shelter, and education that contribute to promoting and enhancing the health of communities (Akabanda et al., 2017). Community-based health workers can assist in addressing these issues because they are the front-line force of protection against emergencies because they have local knowledge. Due to the rise in the number and frequency of emergencies, changing hazards (such as conflicts and the effects of climate change), and growing vulnerabilities (such as rapid and unplanned urbanization, lack of resources, and poverty), the National Disaster Management Practitioners, Islamabad, Pakistan, believe that these issues should be addressed (MacQueen et al., 2001).

Natural catastrophes can contribute to outbreaks of disease in a limited geographic area by damaging infrastructure, displacing people, and hampering the function of public health programs. Flooding is present in about 40% of natural disasters; it can be associated with hurricanes, tsunamis, storm surges, or heavy rainfall over some time (Isidore et al., 2012). One of the primary effects of severe flooding is that it forces people to relocate, often overcrowded shelters where diseases can quickly spread. Another is damage to water systems, especially sewage treatment and water purification systems, which can spread sewage and contaminated soils across large areas, exposing whole populations to infectious material, both during and after floods. When sewage mixes with drinking water or contaminates shellfish, diarrhea and dysentery often follow, and these are the primary causes of mortality in evacuees and refugee camps (40% of all deaths) (Glutting, 2017). Large increases in disease were reported after the 2004 Bangladesh flood and the 2000 Mozambique floods. In the U.S., the flooding of New Orleans after Hurricane Katrina in 2005 led to several health issues. These included both toxogenic and non-toxogenic cholera outbreaks and a norovirus outbreak among evacuees and relief workers in Houston. There were also outbreaks of diarrheal disease among evacuees in Louisiana, Tennessee, and Mississippi. Tropical Storm Allison in Texas (2001) produced a similar pattern of gastrointestinal outbreaks. In both events, initial reports indicated that floodwaters contained 100 times the *Escherichia coli* (*E. coli)* concentrations found in normal river runoff (Glutting, 2017).

According to the Flood and Communicable Diseases fact sheets of WHO (2004) and ARCHIVE Global (2018) the major risk factor for outbreaks associated with flooding is the contamination of drinking-water facilities, and even when this happens, as in Iowa and

Missouri in 1993, the risk of outbreaks can be minimized if the risk is well recognized and disaster response addresses the provision of clean water as a priority. In Tajikistan in 1992, the flooding of sewage treatment plants led to the contamination of river water (WHO, 2005). Despite this risk factor, no significant increase in the incidence of diarrheal diseases was reported. A typhoon in Truk District, Trust Territories of the Pacific, in 1971 disrupted catchment water sources and forced people to use many different sources of groundwater that were heavily contaminated with pig feces. As a result, there was an outbreak of *balantidiasis*, an intestinal protozoan. A cyclone and flooding in Mauritius in 1980 led to an outbreak of typhoid fever. Outbreaks of leptospirosis occurred in Brazil in 1983, 1988, and 1996, Nicaragua in 1995, the Krasnodar region, the Russian Federation in 1997, Santa Fe, USA in 1998, Orissa, India in 1999, and Thailand in 2000. The occurrence of flooding after heavy rainfall facilitates the spread of the organism due to the proliferation of rodents, which shed large amounts of leptospirosis in their urine (see Flooding and communicable diseases fact sheet) (WHO, 2004).

METHODOLOGY

A research design is a comprehensive strategy for finding answers to the study questions and addressing some challenges that may arise (Polit & Hungler, 1998). Additionally, research designs are created to satisfy each study's particular needs. Preiser et al. (2018) stated that a research design is a blueprint or detailed plan for conducting a research study. Polit and Beck (1998) and Wood and Haber (1998) said that choosing an effective research design should be influenced by a critical factor, namely, if the design offers the most reliable responses to the research question.

The study used quantitative research to achieve the research objectives and address the research problem. Data figures was calculated and derived from quantitative research. It is concerned mainly with measurable phenomena that can be observed and measured involving individuals, events, or objects as well as determining the strength of the correlation between variables, typically by statistical tests (Couchman & Dawson, 1995).

The features of this research study fall under the quantitative research paradigm. Its focus is concise and narrow. A structured questionnaire was used for statistical analysis and quantifying the responses. Through the systematic collection of data, the researcher preserved objectivity. Furthermore, an in-depth literature review was conducted, which served as the basis for developing the data collection instrument. Wood and Haber (1998) stated that objectivity in conceptualizing the problem is derived from a literature review and theoretical framework.

In this present study, the researcher assessed the awareness and practices of BHWs in response to waterborne diseases caused by flooding. Likewise, it determines respondents' profile variables, their awareness of the selected waterborne diseases, and their practices in preventing waterborne diseases caused by flooding.

RESULTS AND DISCUSSION

The presentation, interpretation, and analysis of the data are the topics covered in this chapter. The data gathered in the study are presented herein in tabular form, together with the interpretation made by the researcher regarding the awareness and practices of barangay health workers regarding waterborne diseases; this is the basis for a proposed capability-training plan.

Table 1. Distribution of Respondents in terms of their Profile Variables

Profile Variables	Frequency	Percentage
Age		
20-30	14	23.33
31-40	46	76.67
Sex		
Male	6	10
Female	54	90
Civil Status		
Single	10	16.67
Married	50	83.33
Widowed		
Monthly Family Income		
Less than 10,957	48	80
Between 10,957 to 21,194	12	20
Highest Educational Attainment		
Highschool Level	22	36.67
Highschool Graduate	38	63.33
Relevant training Attended for the past two years		
1-2	48	80
3-4	12	20

Profile of the Respondents

The respondent's profile for barangay health workers regarding their age, sex, civil status, highest educational attainment, and relevant training attended in the past two years. Most respondents are under the age bracket of 20-30 years old, most of the respondents are female, and most of the respondents are married, the income of 3001-5,000 comprises 48 or 80%. most of the respondents have low family income and are identified as poor, the respondent's high school graduates, and the respondents' relevant training attended 1-2 years.

Table 2. Level of Awareness of BHWs on Waterborne Diseases along Typhoid Fever

Indicators	Weighted Mean	Transmuted Value
I am aware that…		
1. Typhoid fever is a life-threatening infection caused by the bacterium Salmonella Typhi.	2.68	MA
2. It is usually spread through contaminated food or water.	3.63	A
3. Typhoid risk is higher in populations that lack access to safe water and adequate sanitation.	3.27	MA
4. Flooded community areas or poor communities and vulnerable groups, including children, are at the highest risk.	3.67	A
5. Vaccines have been used for many years to protect people from typhoid fever.	2.82	MA
6. Typhoid fever can be treated with antibiotics, although increasing resistance to different types of antibiotics is making treatment more complicated.	2.53	MA
7. Even when the symptoms go away, people may still be carrying typhoid bacteria, meaning they can spread it to others through their feces/stool.	3.33	MA
8. To avoid typhoid fever, make sure food is properly cooked and still hot when served.	3.67	A
9. Avoid raw milk and products made from raw milk, and drink only pasteurized or boiled milk.	2.52	MA
10. Wash hands thoroughly and frequently using soap, in particular after contact with pets or farm animals, or after having been to the toilet.	3.67	A
Total Weighted Mean	3.18	MA

Legend:

Statistical Value	Descriptive Equivalent	Transmuted value
4.50 - 5.00	Always	Highly Aware (H.A.)
3.50 - 4.49	Often	Aware (A)
2.50 - 3.49	Sometimes	Moderately Aware (MA)
1.50 - 2.49	Seldom	Slightly Not Aware (SNA)
1.00 - 1.49	Never	Not Aware (N.A)

As shown in Table 3, the respondents' gathered data has a 3.18 total weighted mean with a descriptive equivalent of "sometimes" and a transmuted value of "moderately aware" in the given data illustrated in typhoid fever. The indicators "Vulnerable populations, notably children, in poor or flood-prone communities are at most danger."; "To avoid typhoid fever, make sure food is properly cooked and still hot when served," and "Wash your hands thoroughly and regularly with soap, especially after handling pets or farm

animals or after using the restroom." got the highest statistical value of 3.67 with the descriptive equivalent of "often." According to the World Health Organization (2018), typhoid is a potentially fatal infection caused by the bacterium Salmonella Typhi. Typhoid affects between 11 and 20 million individuals, and between 128,000 and 161,000 people may be away each year. Typically, it is disseminated through contaminated food or water. Urbanization and climate change can potentially increase typhoid's global burden. Typhoid is also spreading more quickly due to overcrowding in urban areas, insufficient sanitation facilities, and an increase in drug resistance (Haque et al., 2018).

Table 3. Level of Awareness of BHWs on Waterborne Diseases along Cholera

Indicators	Weighted Mean	Transmuted Value
I am aware that…		
1. Cholera is an acute diarrheal illness caused by infection through contaminated foods or water.	3.18	MA
2. Frequent handwashing with soap before and after activity can prevent transmitted diseases like cholera.	4.07	A
3. Eating healthy foods can boost immunity to fight communicable diseases like cholera.	3.33	MA
4. Drinking clean and purified water can prevent cholera.	4.05	A
5. Covering existing foods or properly placing them in to fridge to avoid contamination.	3.75	A
6. A clean environment can reduce or eradicate transmitted diseases like cholera.	4.05	A
7. The significance of household toilets and proper location.	3.72	A
8. The importance of household drinking water source and store water.	3.77	A
9. Basic first aid for cholera to avoid dehydration and complication if left untreated.	2.95	MA
10. The importance of getting vaccinated with cholera vaccines.	3.67	A
Total Weighted Mean	3.65	A

Legend:

Statistical Value	Descriptive Equivalent	Transmuted value
4.50 - 5.00	Always	Highly Aware (H.A.)
3.50 - 4.49	Often	Aware (A)
2.50 - 3.49	Sometimes	Moderately Aware (MA)
1.50 - 2.49	Seldom	Slightly Not Aware (SNA)
1.00 - 1.49	Never	Not Aware (N.A.)

Moreover, the indicator about drinking only pasteurized or boiling milk and staying away from raw milk and products produced from it got the lowest statistical value of 2.52 with the descriptive equivalent of "sometimes" based on the descriptive equivalent.

Therefore, according to WHO (2018), avoid raw milk products, which can also cause and spread typhoid fever.

Hence, with the presented findings, respondents are somewhat mindful of the possible causes of typhoid fever. Furthermore, BHWs are designated in the community to provide health services. As such, collaborators should have the capability and confidence to disseminate essential health information. The study reiterated the importance of increasing the confidence and morale of BHWs to perform prevention and promotional tasks. As a result, the BHWs valued the opportunity to learn about key interventions; their awareness of community interventions was raised; and their confidence increased.

As shown in Table 4, the respondents' gathered data has a 3.65 total weighted mean with a descriptive equivalent of "often" and a transmuted value of "aware" in the given data illustrated in cholera. The indicator "Frequent handwashing with soap before and after activity can prevent transmitted diseases like cholera" got the highest statistical value of 4.07 with the descriptive equivalent of "often" based on the descriptive equivalent. According to a WHO projection for 2022, worldwide, there are 21,000 to 143,000 cholera-related deaths each year and 1.3 to 4.0 million cases of the disease. To control cholera and lower mortality rates, a diversified strategy is essential. Oral cholera vaccinations are utilized in addition to monitoring, access to clean water and sanitation, social mobilization, and treatment.

Meanwhile, the indicator "basic first aid for cholera to avoid dehydration and complications if left untreated" got the lowest statistical value of 2.95 with the descriptive equivalent of "sometimes" based on the descriptive equivalent. World Health Organization (2022a) also noted that extremely dehydrated patients need to get intravenous fluids quickly since they run the danger of going into shock. Additionally, these patients receive the proper antibiotics or medication to minimize the time that they experience diarrhea, lessen the number of rehydration fluids that they require, and lower the amount and duration of cholera excretion in their stool (Azman et al., 2013).

The findings show that BHWs are mindful of cholera. According to Olu et al. (2016) community-based health workers can help to address such problems since they have the capability and training for emergencies and health risks to teach the community members about health preparedness, thereby decreasing their vulnerabilities in times of emergencies and disasters. This will be done through health education among the residents as well as home visits by the BHWs and health awareness programs.

According to Public Health Laboratory Services (Wilson et al., 2010) sewage, human and animal waste, pesticides and insecticides, fertilizers, oil, asbestos, rusting construction components, and other contaminants frequently end up in flood water. Therefore, leptospirosis is a disease caused by contaminated food or water.

Table 4. Level of Awareness of BHWs on Waterborne Diseases along Leptospirosis

Indicators	Weighted Mean	Transmuted Value
I am aware that…		
1. Leptospirosis is an infectious disease that affects humans. It is considered one of the world's most widespread re-emerging zoonotic diseases.	2.85	MA
2. Directly or indirectly transmitted to humans through contact with infected animal urine in water caused by flooding.	3.58	A
3. Animals that are most likely to spread the disease are rodents e.g rats, bats, etc.	4.03	A
4. Wet or stagnant flooded areas are most likely sources for certain infections and have attracted certain rodent species.	3.67	A
5. The increasing number of rodents in wet and stagnant floodwater areas is mainly due to the presence of food remnants, poor sanitation, and improper waste disposal.	3.68	A
6. Workers may pose a risk of acquiring leptospirosis through exposure to *Leptospira infections* in contaminated water and flooded environment areas.	3.82	A
7. The importance of proper hygiene after contact with contaminated water caused by flooding.	3.73	A
8. Use protective clothing or footwear should be worn by those people workers exposed to contaminated water or soil.	3.67	A
9. The disease has also been associated with swimming and wading, in contaminated lakes and rivers.	3.62	A
10. The incubation period is usually 5–14 days, with a range of 2–30 days. If not treated, the patient could develop kidney failure, meningitis, liver damage, and respiratory distress. In some cases, death occurs.	3.18	MA
Total Weighted Mean	3.58	A

Legend:

Statistical Value	Descriptive Equivalent	Transmuted value
4.50 - 5.00	Always	Highly Aware (H.A.)
3.50 - 4.49	Often	Aware (A)
2.50 - 3.49	Sometimes	Moderately Aware (MA)
1.50 - 2.49	Seldom	Slightly Not Aware (SNA)
1.00 - 1.49	Never	Not Aware (N.A.)

As observed, the respondents' gathered data has a 3.58 total weighted mean with a descriptive equivalent of "often" and a transmuted value of "aware" in the given data

illustrated in leptospirosis. The indicator "Animals that are most likely to spread the disease are rodents, e.g., rats, bats, etc." got the highest statistical value of 4.03 with the descriptive equivalent of "often" based on the descriptive equivalent. Leptospirosis is an infectious zoonotic illness that is widespread throughout tropical and subtropical areas and leads to various organ failures in humans, including jaundice, renal failure, and pulmonary bleeding (Arcebido 2018). Nevertheless, there have been few research publications or surveys, and only a few people know the severity of the situation in the Philippines.

Moreover, the indicator "Leptospirosis is an infectious disease that affects humans; it is considered one of the world's most widespread re-emerging zoonotic diseases" got the lowest statistical value of 2.85 with "sometimes" based on the descriptive equivalent. According to the WHO (2019), leptospirosis is a bacterial disease affecting humans and animals. It is caused by Leptospira bacteria, most commonly contracted through the nose, mouth, eyes, or skin abrasions when a person is exposed to water contaminated by urine from infected animals.

Thus, respondents are mindful of leptospirosis. According to Kouadio et al. (2012), re-establishing and improving primary health care delivery after flooding requires the provision of medical supplies and training of barangay health care workers (BHWs) and medical personnel on appropriate case management. Public health responders should set up a rapid disease risk assessment within the first week of the disaster to identify disaster impacts and health needs. Hepatitis A infection is transmitted predominantly by the fecal-oral route, drinking contaminated water, or eating contaminated food, which causes liver inflammation.

As revealed, the respondents' gathered data has a 3.55 total weighted mean with a descriptive equivalent of "often" and a transmuted value of "aware" in the given data illustrated in hepatitis A. The indicator "*The importance of proper disposal of sewage within communities and personal hygiene practices such as regular handwashing before meals and after going to the bathroom to prevent hepatitis A*" got the highest statistical value of 4.02 with the descriptive equivalent of "often" based on the descriptive equivalent. According to WHO (2022b), improved sanitation, food safety, and immunization are the most effective ways to combat hepatitis A. Adequate supplies of safe drinking water can reduce the spread of hepatitis A, as can proper disposal of sewage within communities and personal hygiene practices such as regular handwashing before meals and after going to the bathroom. Also, WHO is working to support countries in moving towards achieving the global hepatitis goals under the "Sustainable Development Agenda 2030," such as raising awareness, promoting partnerships, mobilizing resources, formulating evidence-based policy and data for action, increasing health equities within the hepatitis response, preventing transmission, and scaling up screening, care, and treatment services.

Table 5. Level of Awareness of BHWs on Waterborne Diseases along Hepatitis *A*

Indicators	Weighted Mean	Transmuted Value
I am aware that…		
1. Hepatitis A is very contagious. It is spread when someone unknowingly ingests the virus through close personal contact with an infected person or through eating contaminated food or drinking water.	3.73	A
2. Persons at increased risk for HAV infection include people who migrated to areas with high or intermediate hepatitis A endemic.	3.48	MA
3. The importance of encouraging people to be tested for certain communicable diseases like Hepatitis A.	3.47	MA
4. Hepatitis A infection can be prevented by getting the vaccine or immune globulin before coming into contact with the virus.	3.67	A
5. The risk of hepatitis A infection is associated with a lack of safe water and poor sanitation and hygiene (such as contaminated and dirty hands).	3.35	MA
6. In families, this may happen through dirty hands when an infected person prepares food for family members.	3.75	A
7. Waterborne outbreaks, though infrequent, are usually associated with sewage-contaminated or inadequately treated water.	3.55	A
8. Hepatitis A virus can also be transmitted through close physical contact (such as oral-anal sex) with an infectious person.	3.77	A
9. The incubation period of hepatitis A is usually 14–28 days.	2.73	MA
10. The importance of proper disposal of sewage within communities; and personal hygiene practices such as regular handwashing before meals and after going to the bathroom to prevent hepatitis A.	4.02	A
Total Weighted Mean	3.55	A

Meanwhile, the indicator "*The incubation period of hepatitis A is usually 14–28 days*" got the lowest statistical value of 2.73 with the descriptive equivalent of "sometimes." According to the European Centre for Disease Prevention and Control (ECDC) (2017), hepatitis A is highly transmissible and has an average incubation period of 28 to 30 days (range 15–50 days). The maximum infectivity is during the second half of the incubation period (i.e., while asymptomatic). Most cases are considered non-infectious after the first week of jaundice. Hepatitis A can be transmitted through contaminated water, food, and the fecal-oral route among close contacts.

Therefore, BHWs are mindful of hepatitis A as a waterborne disease. However, in the study of Epidemic Control for Volunteers (2008), the role of BHWs during emergencies could have been better defined. It was suggested that community health workers should perform three significant groups of actions, including health promotion, prevention activities, and case management and referral. Thus, BHWs' awareness and practices through training and resources for future disasters are deemed necessary.

Table 6. Level of Practices of BHWs in the prevention of waterborne diseases along Water Sanitation

Indicators	Weighted Mean	Transmuted Value
I Practice…		
1. The importance of having sewerage filters coming from households, and water treatment plants to those coming from industrial areas to prevent water pollution.	3.95	P
2. Treating water in any way to make it safer to drink (e.g Boiling for at least 15 minutes, Purification, etc.)	4.10	P
3. Proper disposal and waste segregation to avoid pollution of the environment resulting in contamination of water resources.	3.63	P
4. Planting more trees to balance the ecosystem to preserve the environment, most likely the water reservoir.	2.72	MP
5. The importance of having an isolated toilet septic tank to prevent contamination of groundwater source.	3.33	MP
6. Proper installation of deep well water sources.	4.00	P
7. Installation of household water filters into faucet if necessary.	2.67	MP
8. Essentially avoid using and dumping plastic waste products into drainage canals, rivers, and oceans.	3.63	P
9. Not to use strong chemicals in farming like insecticides/pesticides in our agricultural land concerning water contamination.	3.33	MP
10. Use of chlorination water purification process this method is used to kill bacteria, viruses, and other microbes in water.	3.67	P
Total Weighted Mean	3.50	P

Water sanitation is one of the essential practices, such as boiling and chlorination, to make the water safe for drinking. Hence, Table 6 displays the practices of BHWs in the prevention of waterborne disease along with water sanitation. Moreover, the respondents' gathered data has a 3.50 total weighted mean with a descriptive equivalent of "often" and a transmuted value of "aware" in the given data illustrated in water sanitation. The indicator "Treating water in any way to make it safer to drink (e.g., boiling for at least 15 minutes,

purification, etc.)" got the highest statistical value of 4.10 with the descriptive equivalent of "often" based on the descriptive equivalent. According to Mapulanga and Naito (2019), there is a link between environmental quality and human health. The quality and amount of water that is readily accessible to urban and rural people are influenced by rivers, lakes, forests, and all other water-related ecosystems. It becomes more difficult to provide clean drinking water and sanitary facilities in areas where environmental deterioration develops. Deforestation of watersheds, for instance, can lessen household access to clean drinking water and increase the risk of landslides and flash floods as well as the amount of sediment and turbidity in water sources.

In addition, water quality is also affected by excessive chemicals from fertilizers and detergents, salinity intrusion, and organic waste. Although developing countries discharge almost 90% of sewage untreated into bodies of water, 1.8 billion people use a source of drinking water with fecal contamination. At the current rate of progress, by 2030, there will still be 1.6 billion people without access to safe drinking water at home (Bhaduri et al., 2016).

Meanwhile, the indicator "*Installation of household water filters into faucets if necessary*" got the lowest statistical value of 2.67 with the descriptive equivalent of "sometimes" based on the descriptive equivalent (Treacy, 2019). Filtration and innovations in filtration are growing interests in the water industry. Essential filtration involves the use of porous stones and a variety of other natural materials to filter visible contaminants from the water. Many porous materials are locally available and inexpensive options for filtering water. They are simple and easy to use, and the filtering material has a long lifetime. However, filtration has drawbacks due to maintenance issues such as backflushing of filters and a lack of residual effects from disinfection.

In conclusion, BHWs practice water sanitation in the prevention of waterborne diseases. According to the Department of Health [DOH] (2010), the primary strategy to prevent food and waterborne diseases (FWBDs) is avoiding food and water contamination. The fundamental principles in limiting and controlling the spread of water-related diseases are: 1) water treatment and disinfection before use. 2) Proper personal and domestic hygiene 3) Adequate waste disposal, as well as rodent and fly control measures.4) Proper medical health care Likewise, safe food preparation is one of the critical principles for preventing waterborne-related diseases.

As such, the respondents' gathered data has a 4.07 total weighted mean with a descriptive equivalent of "often" and a transmuted value of "aware" in the given data illustrated in safe food preparation. With the descriptive equivalent of "often," the indicator "Choose fresh food and ingredients for healthier" received the highest statistical value of 4.30. According to the National Institutes of Health (2017), unhygienic practices during food preparation, handling, and storage create conditions that allow the proliferation and transmission of disease-causing organisms, which include bacteria, viruses, and other food-borne pathogens. That is why choosing fresh ingredients is crucial in food preparation to prevent diseases.

Table 7. Level of Practices of BHWs in the prevention of waterborne diseases along Safe Food Preparation

Indicators	Weighted Mean	Transmuted Value
I Practice…		
1. Hand washing thoroughly before and after food preparation.	3.80	P
2. Cook food carefully to avoid contamination that will result in food poisoning.	4.28	P
3. Consumed all cooked food as necessary.	3.88	P
4. Keeping all kitchen materials and surfaces clean and dry.	4.20	P
5. Stored cooked foods carefully into a chiller or cooler if necessary.	3.82	P
6. Choose fresh food and ingredients for healthier.	4.30	P
7. Use clean or purified water in preparation for foods to be cooked.	4.07	P
8. Protect food and food ingredients from insects, rodents, and other animals.	4.18	P
9. Avoid contact with raw foods into cooked foods to prevent cross-contamination.	3.83	P
10. Reheat cooked food thoroughly before you serve or eat.	4.28	P
Total Weighted Mean	4.07	P

Meanwhile, the indicator "*hand washing thoroughly before and after food preparation*" got the lowest statistical value of 3.80 with the descriptive equivalent of "often" based on the descriptive equivalent. Washing your hands before eating is one of the most essential things you can do to avoid food poisoning (Center for Disease Control and Prevention, 2022). The hands might transfer germs into the kitchen, which is the cause. Anyone can become ill from some of these microbes, including Salmonella.

These findings support the results of the preceding table, in which BHWs consistently practice safe food preparation to prevent waterborne diseases. According to the Global Disaster Preparedness Center (2014), barangay health workers in the Philippines are trained health workers who live in the communities they serve. In addition to providing information, education, and motivational services for primary healthcare, maternity and child health, children's rights, family planning, and nutrition, they serve as change agents in the communities. As a result, BWHs typically come from the same neighborhoods and should have excellent knowledge of and relationships in the neighborhood. Besides, waste management is as vital as water sanitation and safe food preparation practices to prevent waterborne diseases. Table 8 shows the level of practices used by BHWs to prevent waterborne diseases.

The respondents gathered data on the table with a 4.47 total weighted mean and a descriptive equivalent of "often" with a transmuted value of "aware" in the given data illustrated in waste management. The indicator "Proper waste segregation and appropriate disposal to avoid obstruction of water drainage that possibly causes flooding" got the highest statistical value of 4.85 with the descriptive equivalent of "always" based on the descriptive equivalent.

Moreover, the indicator "Importance of educating people on waste management programs" got the lowest statistical value of 3.90 with the descriptive equivalent of "often." This result implies that the respondents regularly practice proper waste management.

Table 8. Level of Practices of BHWs in the prevention of waterborne diseases along Waste Management

Indicators	Weighted Mean	Transmuted Value
I Practice…		
1. Importance of educating people on a waste management program.	3.90	P
2. Proper dumping of animal sewage, and agricultural waste products that commonly cause surface water pollution.	4.28	P
3. How to recycle waste products to gain more benefit to the environment.	4.80	HP
4. Proper waste segregation and appropriate disposal to avoid obstruction of water drainage that possibly causes flooding.	4.85	HP
5. Classify hazardous household waste products to prevent dangerous effects on humans, animals, and the environment.	4.50	HP
6. Be aware of waste management laws and report any illegal dumping of waste and hazardous waste.	4.57	HP
7. Practicing an organic diet reduces the amount of dangerous chemical pollution in water sources. Organic foods also tend to be produced with fewer toxic and dangerous chemicals.	4.20	P
8. Improvements in our efficiency to turn consumed goods into consumable goods with minimal damage to the environment.	4.55	HP
9. Composting and creating rich humus for vegetable gardens and lawns.	4.50	HP
10. Using biodegradable things to decrease waste products sourced by non-biodegradable stuff.	4.57	HP
Total Weighted Mean	4.47	P

Republic Act No. 9003 establishes the required institutional framework, provides the necessary incentives, outlaws specific behaviors and imposes penalties, appropriates cash for various uses, and furthers other objectives to create an ecological solid waste management program. By defining and putting into practice the finest environmental practices in ecological waste management, the right segregation, collection, transport, storage, treatment, and disposal of solid waste are also secured. Under the relevant R.A. According to No. 7160, also referred to as the Local Government Code, the LGUs are in charge of carrying out and enforcing the requirements of this Act within their respective territories.

Table 9. Significant Difference in the Level of Awareness of the BHWs on the Selected Waterborne Diseases and their Sex

Level of Awareness	F	Sig	t	df	Sig
Typhoid Fever	.264	.609	.895	58	.375
			.938	6.316	.383
Cholera	.181	.672	1.122	58	.267
			1.058	6.002	.331
Leptospirosis	1.881	.175	.000	58	1.000
			.000	5.724	1.000
Hepatitis A	.808	.372	-1.672	58	.100
			-1.979	6.810	.089
Average	.062	.805	.122	58	.903
			.127	6.295	.903

The t-test result in Table 9 revealed no statistically significant differences in the BHWs' levels of awareness about the chosen waterborne diseases and their sex (typhoid fever, $F(58,6316) = .264$ $p = 0.375, .383$; Cholera, $F(58,6.002) = 0.181$ $p = .267,.331$; Leptospirosis, $F(58,5.724) = 1.881$ $p = 1.000,1.000$; hepatitis A, $F(58,6.810) = .808$ $p = .100,.089$; average, $F(58,6.295) = .062$ $p = 0.903, 0.903$.

The ANOVA findings (Table 10) revealed statistically significant variations in the age and awareness of the BHWs about the chosen waterborne illnesses. Where in typhoid fever $F(1,58) = 5.914$ $p = .018$; Cholera $F(1,58) = .121$ $p = .729$; Leptospirosis $F(1,58) = .025$; $p = .876$; Hepatitis A $F(1,58) = .002$ $p = .962$; in Average $F(1,58) = 1.434$ $p = .236$.

The ANOVA analysis findings (Table 11) revealed a significant difference between awareness and civil status where in typhoid fever, $F(1,58) = 0.001$, $p = 0.971$; Cholera, $F(1,58) = 4.228$, $p < 0.05$; Leptospirosis, $F(1,58) = 15.223$, $p < 0.005$; Hepatitis A, $F(1,58) = 0.001$, $p = 0.975$; and Average, $F(1,58) = 8.206$, $p < 0.05$.

Table 10. Significant Difference in the Level of Awareness of the BHWs on the Selected Waterborne Diseases and their Age

Level of Awareness		Sum of Squares	Df	Mean Squares	F	Sig
Typhoid Fever						
	Between Groups	.137	1	.137	5.914	.018
	Within Groups	1.345	58	.023		
Cholera						
	Between Groups	.004	1	.004	.121	.729
	Within Groups	2.005	58	.035		
Leptospirosis						
	Between Groups	.001	1	.001	.025	.876
	Within Groups	1.603	58	.028		
Hepatitis A						
	Between Groups	.000	1	.000	.002	.962
	Within Groups	2.030	58	.035		
Average						
	Between Groups	.011	1	.011	1.434	.236
	Within Groups	.441	58	.008		

Table 11. Significant Difference in the Level of Awareness of the BHWs on the Selected Waterborne Diseases and their Civil Status

Level of Awareness		Sum of Squares	Df	Mean Squares	F	Sig
Typhoid Fever						
	Between Groups	.000	1	.000	.001	.971
	Within Groups	1.482	58	.026		
Cholera						
	Between Groups	.137	1	.137	4.228	.044
	Within Groups	1.873	58	.032		
Leptospirosis						
	Between Groups	.333	1	.333	15.223	.000
	Within Groups	1.270	58	.022		
Hepatitis A						
	Between Groups	.000	1	.000	.001	.975
	Within Groups	2.030	58	.035		
Average						
	Between Groups	.056	1	.056	8.206	.006
	Within Groups	.396	58	.007		

Table 12. Significant Difference in the Level of Awareness of the BHWs on the Selected Waterborne Diseases and their Monthly Family Income

Level of Awareness		Sum of Squares	Df	Mean Squares	F	Sig
Typhoid Fever						
	Between Groups	.000	1	.000	.007	.936
	Within Groups	1.482	58	.026		
Cholera						
	Between Groups	.000	1	.000	.011	.917
	Within Groups	2.009	58	.035		
Leptospirosis						
	Between Groups	.000	1	.000	.000	1.000
	Within Groups	1.603	58	.028		
Hepatitis A						
	Between Groups	.054	1	.054	1.585	.213
	Within Groups	1.976	58	.034		
Average						
	Between Groups	.003	1	.003	.412	.523
	Within Groups	.449	58	.008		

There are no appreciable variations between awareness and family income, according to the ANOVA results. Where in typhoid fever F (1,58) = .007 p= .936; Cholera F (1,58) = .001 p= .917; Leptospirosis F (1,58) = .000 p= 1.000; Hepatitis A F (1,58) = 1.585 p= .213; in Average F (1,58) = .412 p= .523 (Table 12).

The ANOVA findings revealed that there are no significant differences between awareness and highest educational attainment. Where in typhoid fever F (1,58) = .109 p= .743; Cholera F (1,58) = .011; p= .917; Leptospirosis F (1,58) = .120 p= .730; Hepatitis A F (1,58) = .532 p= .469; in Average F (1,58) = .182; p= .671 (Table 13).

The ANOVA results showed a statistically significant difference in the level of awareness of the BHWs on the selected waterborne diseases and their relevant training. Where in typhoid fever F (1,58) = .105; p= .748; Cholera F (1,58) = .350; p= .557; Leptospirosis F (1,58) = 4.949; p= .030; Hepatitis A F (1,58) = .694; p= .408; in Average F (1,58) = .1.685; p= .199 (Table 14).

Table 13. Significant Difference in the Level of Awareness of the BHWs on the Selected Waterborne Diseases and their Highest Educational Attainment

Level of Awareness		Sum of Squares	Df	Mean Squares	F	Sig
Typhoid Fever						
	Between Groups	.003	1	.003	.109	.743
	Within Groups	1.479	58	.026		
Cholera						
	Between Groups	.000	1	.000	.011	.917
	Within Groups	2.009	58	.035		
Leptospirosis						
	Between Groups	.003	1	.003	.120	.730
	Within Groups	1.600	58	.028		
Hepatitis A						
	Between Groups	.018	1	.018	.532	.469
	Within Groups	2.011	58	.035		
Average						
	Between Groups	.001	1	.001	.182	.671
	Within Groups	.451	58	.008		

Table 14. Significant Difference in the Level of Awareness of the BHWs on the Selected Waterborne Diseases and their Relevant Training

Level of Awareness		Sum of Squares	Df	Mean Squares	F	Sig
Typhoid Fever						
	Between Groups	.003	1	.003	.105	.748
	Within Groups	1.479	58	.026		
Cholera						
	Between Groups	.012	1	.012	.350	.557
	Within Groups	1.997	58	.034		
Leptospirosis						
	Between Groups	.126	1	.126	4.949	.030
	Within Groups	1.477	58	.025		
Hepatitis A						
	Between Groups	.024	1	.024	.694	.408
	Within Groups	2.006	58	.035		
Average						
	Between Groups	.013	1	.013	1.685	.199
	Within Groups	.439	58	.008		

Table 15. Correlation Between the Level of Awareness and Practices of the BHWs and their Profile Variables

Variable		Age	Sex	Civil Status	Monthly Family Income	Highest Educational Attainment	Relevant Trainings
Typhoid	Pearson Corr	.304*	-.117	-.005	-.011	-.043	.042
	Sig.	.018	.375	.971	.936	.743	.748
Cholera	Pearson Corr	.046	-.146	-.261*	.014	-.014	-.077
	Sig.	.729	.267	.044	.917	.917	.557
Leptospirosis	Pearson Corr	-.021	.000	-.456**	.000	.045	.280*
	Sig.	.876	1.000	.000	1.000	.730	.030
Hepatitis A	Pearson Corr	.006	.214	.004	-.163	-.095	.109
	Sig.	.962	.100	.975	.213	.469	.408
Average Awareness	Pearson Corr	.155	-.016	-.352**	-.084	-.056	.168
	Sig.	.236	.903	.006	.523	.671	.199
Water Sanitation	Pearson Corr	-.205	-.094	.170	.090	-.005	.140
	Sig.	.116	.477	.193	.493	.971	.285
Safe Food	Pearson Corr	-.175	.234	-.030	-.199	-.099	-.191
	Sig.	.181	.071	.819	.127	.450	.144
Waste Management	Pearson Corr	.187	-.088	-.109	-.053	-.071	-.168
	Sig.	.153	.506	.406	.687	.588	.199
Average Practices	Pearson Corr	-.075	.100	-.035	-.143	-.106	-.183
	Sig.	.569	.447	.790	.274	.420	.161

*. Correlation at 0.05 (2-tailed)

The Pearson r coefficient results revealed a substantial correlation between the BHWs' practices and profile characteristics, including age, civil status, and relevant training attended (Table 15).

CONCLUSIONS AND RECOMMENDATIONS

This research was geared toward assessing the awareness and practices of barangay health workers toward waterborne diseases as the basis for a proposed capability-training plan. Based on the previous findings, the following conclusions were derived: The study findings show that the respondents are mostly middle-aged females, married with low monthly incomes, and secondary education graduates with 1-2 years of relevant training. Respondents are somewhat aware of typhoid fever, as well as leptospirosis and hepatitis A. Likewise, for their practices of BHWs, it is mentioned that they practice water sanitation, food preparation, and waste management.

The study found that there were considerable differences in the BHWs' knowledge of and practices about waterborne infections depending on their age, civil status, and related training attended. It is also revealed that there is a significant relationship between the respondent's level of awareness and practices regarding waterborne diseases and their practices in the prevention of waterborne diseases in terms of their age, civil status, and related training attended. Lastly, a proposed capability plan was formulated to strengthen their roles in providing patient-centered care.

As the foundation for a suggested capability-training plan, the researcher advises narrowing the study's attention to the knowledge and behaviors of barangay health workers regarding waterborne diseases. Regular attendance at seminars and training sessions is highly recommended to enhance knowledge, skills, and attitude, which can ultimately boost self-confidence and performance when providing healthcare services to the community.

Barangay health workers must be fully informed of their responsibilities and given the knowledge and skills necessary to perform them as members of the health team. Positive working relationships with coworkers, managers, barangay officials, and customers may also be indicators of effective work.

It is recommended that in training plans regarding health advocacy, wellness promotion, and disease prevention, barangay residents have trust in and collaborate with BHWs. It is strongly advised that they treat the BHWs as essential members of the medical team, as they are the ones receiving the BHWs' health care services. They must cooperate in whatever activities are being undertaken in the barangay, believing that many worthwhile achievements may be accomplished through the spirit of unity and oneness.

The level of performance of BHWs should be continuously raised, so it is important to conduct regular performance evaluations of them to establish baseline data on their competence. The contributions made by BHWs to the healthcare team must be acknowledged by the health administration. They must be given responsibility for performance enhancement. Give BHWs the chance to gain new knowledge and skills

through training and orientation regarding the Department of Health's various programs. The definition of the selection criteria for BHWs is encouraged in order to guarantee service effectiveness. BHWs were given rewards, thanks, or recognition for their excellent work, and laws and barangay rules for their welfare were suggested.

The Health Administration should formulate policies for the welfare of BHWs so they will be encouraged and motivated to perform well in their work. Moreover, full implementation of R.A. 7883, known as "An Act Granting Benefits and Incentives to Accredited Barangay Health Workers and for Other Purposes," will boost morale and encourage employees to perform their duties and functions to the best of their abilities.

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DECLARATION

Conflict of Interest

There are no conflicts of interest amongst the writers that may be seen as material to the article's content.

Informed Consent

Informed consent was obtained from all respondents involved in the study.

Ethics Approval

Approval to conduct the study was obtained.

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Author's Biography

Roniel D. Aquino is a registered nurse who is currently working in an educational institution as a casual instructor and clinical instructor in nursing school. He previously worked as an emergency room staff nurse in a private hospital. My journey as a nurse educator may be hard at times, but nothing will ever compare to the fulfillment of giving quality nursing care education.