

ASSessment of Methods of Medical Waste Collection in Primary Healthcare Centers in Zaria Local Government Area of Kaduna State

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ABSTRACT

Healthcare services are aimed at improving a healthy environment and wellbeing and preventing potential human health risks and environmental hazards. In the course of doing this wastes generated could really be harmful. Lack of proper management of these medical wastes exposes the health workers, patients, waste handlers and the general public to health risks. Thus, this study focused on the assessment of medical wastes management practices at Zaria Local Government Area of Kaduna State. The study objectives were to; identify the types of medical waste generation, determine the amount of waste generated in each PHC within the wards in the study area, examine the methods of collection and disposal of

Introduction:

Waste management continues to be a rising challenge as population grows along with the industrial development of countries. The existing methods of waste treatment include; landfills gasification, ocean dumping, incineration and recycling. There has always been the need for man to dispose-off the waste generated in the course of his daily activities, and medical waste is part of the total waste streams generated in the built environment. Wastes are being disposed indiscriminately in our

waste by the PHCs and to examine the challenges of medical waste management. A set of questionnaire was administered to all the waste handlers in the PHC amounting to a total of 44. On waste collection, the findings revealed that Anguwan Fatika, Anguwan Alkali and Babban Dodo had the highest (100%) of respondents that confirmed they have available storage equipment. With regards to color coding of waste collection, the study showed that Kake 2(10.5%), Dandutse 2(10.5%), Panmadina 2 (10.5%), Durumin mai Garke 2 (10.5%), Babban Dodo 2(10.5%) and Tukur-Tukur 2 (10.5%) had the highest respondents confirming the availability of colour coding in their PHCs. In addition to the findings of this study, majority (68%) of the respondents confirmed segregating sharp or infectious waste in the PHCs is being practiced in their PHCs. On the issue of waste disposal, the study revealed that, Dambo and Tukur-Tukur had the highest number of respondents 4 (9.0%) that confirmed dumping of waste outside their PHCs. It was recommended that management of the PHCs should endeavor to provide adequate medical waste facilities as well as training of waste handlers in order to achieve optimum results.

Key Words: Waste, Waste Collection, Disposal, Management, Generated

Surroundings, on the streets and in the drains from houses. While industries discharge wastes without pre-treatment are disposed into streams and farmlands and this affects the natural environment. Hospitals and other health-care facilities are not left out of this obnoxious act Coker *et al.*, (1998). Medical Waste is defined as the waste generated from health-care establishments, such as hospitals, primary healthcare centers, private clinics, research facilities, laboratories used in diagnosis, monitoring, and prevention activities (Massrouje, 2001; Silva *et al.*, 2002). Medical waste is a public health issue that attracts attention all over the world (Miyazaki *et al.*, 2005). According to World Health Organization (WHO,2006) Primary Health Care is a whole of societal approach to health that aims at ensuring the highest possible level of health and well being and their equitable distribution

by focusing on people's needs and as early as possible along the continuum from health promotion and disease prevention to treatment and rehabilitation. In some developing countries, most hazardous and toxic wastes are placed on landfills with few safeguards to protect nearby inhabitants and water sources from contamination (Bartlett.*et a.,/* 2001). According to Remy (2001) waste generated in the process of health care consists of variety of materials including hypodermic needles, scalpels, blades, surgical cottons, gloves, bandages, clothes, discarded medicine and body fluids, human tissues and organs, chemicals and others. These are the most environmentally sensitive health-care by products that need greater attention and should be monitored. Various strategies were adopted by national and international bodies on the development and implementation on education and training programs for medical staff and patients emphasizing on proper medical waste management. Several studies have been conducted on Medical waste management.

Statement of the Research Problem

Most of the PHCs in Zaria LGA are located very close to local population clusters. There is thus, serious concern regarding primary health care waste which is often not been properly managed. There is inadequate training of primary health care workers on waste management practices, nonexistent segregation of medical wastes and risky disposal system, dumping sites are open and uncontrolled. Those managing the waste do not disinfect the waste before disposing it. The way and manner that scavengers and children are seen handling or playing with this kind of wastes at dumpsites is a source of concern, as it could have far-reaching health and environmental effects. The waste handling behavior of the people itself is risky. They dispose off their wastes as cheaply and as quickly as possible without considering the hygienic way of doing it. Also, the frequent incineration of wastes at such dumpsites poses serious threats, considering the harzardous nature of some of the medical wastes.

Aim and Objectives

The aim of the study is to assess the Method of Medical Waste Collection and Disposal in Primary Healthcare Centers of Zaria Local Government area of Kaduna State.

Concept of medical waste

Medical waste (MW) has been defined as any waste generated in the diagnosis, treatment or the immunization of human beings and animals. In related research, this includes the production or testing of biological materials from all types of healthcare institutions, including hospitals, clinics, doctor's offices (including dental and veterinary) and medical laboratories (WHO, 1999, 2005). The common method or practice is the co-disposal/improper segregation of MW with municipal solid waste MSW at the point of production/disposal. Sound MSW management continues to be a challenge in Nigeria, as in most developing countries. Though MW constitutes a small fraction of MSW, the potential environmental and health hazards could be deleterious if not handled properly (Blenkham, 1995; Pruss *et al.*, 1999).

Medical waste is considered as one of the major hazards that affect the environment and the health of human beings, since improper management of this waste may pose health hazards through transmission of diseases, the contamination of soil and groundwater and poisonous emissions from improper burning of medical waste (Ja'al, 2003). In the long term, medical waste not only impairs the quality of life of the community, but also affects the welfare of the entire population and the national economy (Massrouje, 2001). However, in developing countries, medical wastes have not received sufficient attention. In many of these countries hazardous and medical wastes are still handled and disposed of together with domestic wastes, thus creating a great health risk to municipal workers, the public and the environment (Silva *et al.*, 2005).

Medical waste management (MWM) has become a critical issue as it poses potential health risks and damage to the environment (Adnane *et al.*, 2013).

It is also of greater importance due to its potential environmental hazards and public health risks with high propensity to result into epidemics (Dehghani *et al.*, 2008). It continues to be a major challenge, particularly, in most healthcare facilities of the developing countries where it is hampered by technological, economical, social difficulties and inadequate training of staff responsible for handling of the waste (Alagoz & Kocasoy, 2008). Poor conduct and inappropriate management and disposal methods exercised during handling and disposal of medical waste (MW) is an increasing significant health hazards and environmental pollution/hazards due to the infectious nature and unpleasant smell of the waste (Chua, Puziah & Subramaniam, 2010). Despite the fact that current medical waste management (MWM) practices vary from hospital to hospital, the problematic areas are similar for all healthcare units and at all stages of management.

Methods of Collection and Disposal of Medical Waste

A study in Port Harcourt shows that only 1% of Primary Health Care Centers had a transport vehicle also 8% of PHCs had an established dumpsite (Stanley, et al 2011). More than 90% of the hospital waste generated in Nigeria is directly disposed on land in an unsatisfactory manner (Vivian, Blama, Ezemokwe, Okafor and Bawa, 2012).

As primitive as open dump method of solid wastes disposal is, Johanness and Boyer (1999) observed that it remains the predominant means in developing countries. Rush brook and Pugh (1999) considered the open dump method of solid waste disposal as both “naïve and dangerous” because of the leaching effects of chemicals and biological contaminants in the wastes, which constitutes a direct route for transmission of communicable diseases. Although, incineration is not an unclean process of disposing wastes, it is still the most effective method of treating HCW because it involves the application of combustion process under controlled condition at high temperature, converting wastes containing stocks of infectious agents and pathological materials to inert mineral residues and gases (Omotoso, Faluyi and Iyanda,

2007). However, incineration is regarded as the most expensive waste management option because it requires capital intensive plant, highly skilled personnel and careful maintenance (Onipede and Bolaji, 2004) and it to the production of dioxins, furans or other toxic pollutants as emissions and residues. Improper HCW disposal method like open air burning, land filling, dumping into water bodies is common in developing countries, constitutes environmental threats, increased vulnerability for potential transmission of communicable diseases and natural disasters.

In developing countries like Nigeria, where many health concerns are competing for limited resources, it is not surprising that the management of healthcare wastes has received less attention and the priority it deserves. Although reliable records of the quantity and nature of healthcare wastes and the management techniques to adequately dispose of these wastes has remained a challenge in many developing countries of the world, it is believed that several hundreds of tons of healthcare waste are deposited openly in waste dumps and surrounding environments, often alongside with non-hazardous solid wastes (Abah and Ohimain, 2010). Unfortunately, practical information on this important aspect of healthcare management is inadequate and research on the public health implications of inadequate management of healthcare wastes are few and limited in scope.

Latch *et al.*, 2003 and Sherer, 2006). Specifically, Castensson (2008) and Kummerer (2009) identified the burying of pharmaceutical waste as being improper for environmental reasons because it is implicated in the leaching of waste into groundwater and surface water. Indeed, HCW management literature in support of the occurrence of pharmaceutical waste in waste water as well as in surface ground and drinking waters abound in studies carried out in developed countries. They include the studies by Herberer (2002); Jones *et al.* (2002); Zuccato *et al.* (2006); Castensson (2008); Kiel *et al.* (2008); and Kummerer (2009). Ngwuluka *et al.* (2011) noted, on the contrary, that while developed countries have been monitoring and determining pharmaceutical wastes, there exists no apparent indication that

Nigeria is monitoring it. They went on to assert as evidence the little awareness in Nigeria about the hazards of 23 pharmaceutical wastes as an emerging contaminant as a result of limited number of actors who are aware of the requirements of regulatory authorities.

Distribution of Primary Health Care Facilities by Wards in Zaria LGA

Wards	Number of PHCs No of Cleaners	Selected	PHCs
Kufena	4	Ang.Dankali, Gabari, Kake & Danmagaji	3
Tudun Wada	2	Tudun wada & Dandutse	4
Gyallesu	2	Gyallesu & Kaku	4
Dambo	1	Dambo	2
Dutsen Abba	3	Dutsen Abba Pammadina & Dorayi	5
Wucciciri	4	Wucciciri, Aba, Dakace & Rubuci	3
Anguwan Fatika	2	Anguwan Fatika & Kofar Kibo	2
Kwarbai A	3	Ang. Magajiya Amaru & Ang. Liman	4
Kwarbai B	1	Anguwan Alkali	2
Anguwan Juma	2	Durumin mai Garke & Anguwan Iya	3
Limancin Kona	4	Babban Dodo, Salmanduna, Ang. Zakara & Kusfa	4
Kaura	2	Anguwan Bishar & Rimi Doko	3
Tukur-Tukur	2	Tukur-Tukur & Tudun Jukun	5
Total	32		44

Source: Department of Health, Zaria LGA (2019)/Author's Compilation

Method of Medical Waste Collection and Disposal

This section tries to analyze the third objective of the study on method of medical wastes collection and disposal. It was achieved by the use of bar charts.

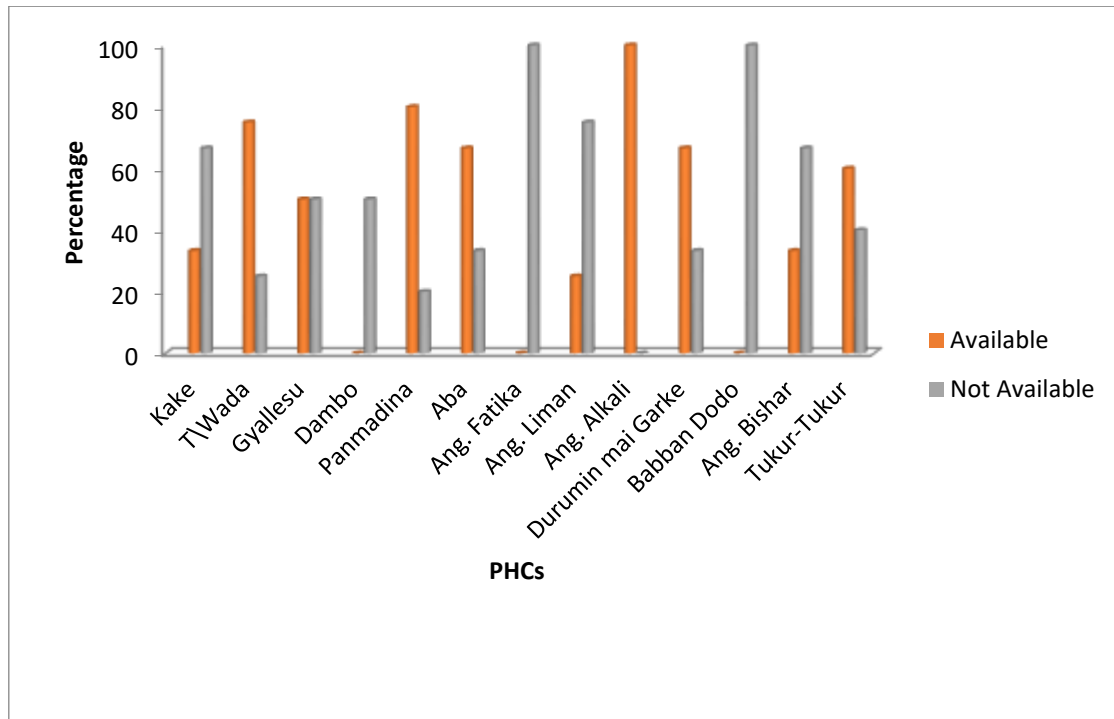


Figure 4.1: Availability of Receptacles/ Storage Containers by PHCs

Source: Author's Field Survey, 2021

Figure 4.1 show that Anguwan Fatika, Anguwan Alkali and Anguwan babban Dodo have the highest (100%) of respondents that confirmed availability of receptacles and storage equipment. The least being Anguwan Liman has 4 (25%). This is because apart from the highest three PHCs with available receptacles and storage equipment, Anguwan Liman has very minimal receptacles and storage equipment. Furthermore, observations around the PHCs with receptacle and storage containers was confirmed during a visit to these PHCs which have one form of container or the other for collection of medical waste as recommended by WHO (2005) In addition, this results is supported by that of Afolabi et al (2018), that (79.2%) stored their waste in dustbins.

Also (Coker et al 2009) reported the use of receptacles and container in healthcare centers in Nigeria such as plastic bags, paper bags or card boards. In addition, (79.2%) stored their waste in dustbins Afolabi et al (2018).

Table 4.4: Availability of Color Coding for Medical Waste Collection by the PHCs

PHCs	Yes		No	
	Frequency	Percentage	Frequency	Percentage
Kake	2	10.5	1	4
T/ wada	2	10.5	2	8
Gyallesu	1	5.3	3	12
Dambo	1	5.3	1	4
Panmandina	2	10.5	3	12
Aba	1	5.3	2	8
Anguwan Fatika	1	5.3	1	4
Anguwan Liman	1	5.3	3	12
Anguwan Alkali	1	5.3	1	4
Durumin mai	2	10.5	1	4
Garke				
Babban Dodo	2	10.5	2	8
Anguwan Bishar	1	5.3	2	8
Tukur-Tukur	2	10.5	3	12
Total	19	100	25	100

Source: Author's Field Survey, 2021

The finding in Table 4.4 shows Kake 2(10.5%), T/wada 2(10.5%), Panmandina 2 (10.5%), Durumin mai Garke 2 (10.5%), Babban Dodo 2(10.5%) and Tukur-Tukur 2 (10.5%) highest (10.5%) of respondents confirming the availability of colour coding in their PHCs respectively while the least was found at Gyallesu, Dambo, Aba, Anguwan Fatika, Anguwan Liman, Anguwan Alkali and Anguwan Bishar 1 (5.3%) respectively.

The reason for having a higher percentage in terms of usage of colour coding in waste collection by the six above mentioned PHCs is that they have a strong community participation in developing their health center, thus they were able to afford colour coding in medical waste management practice. This implies the total percentage of the use of color coding and receptacles across

all the PHCs studied is very low and there is need to further enhance the practice of using color coding and receptacles for medical waste materials in those PHCs with deficiency. In essence color coding helps the staff to easily identify which container to put the waste into, so that segregation can be maintained during transport, storage, treatment and disposal. This observation is in agreement with the study of Afolabi et al, (2018), assessed waste management practices among health care professionals at privately owned health facilities in Ife Central L.G.A. Only 25.0% reporting that they colour coded sorted medical waste and it indicate a low response.

SEGREGATION OF SHARPS OR INFECTIOUS MATERIALS

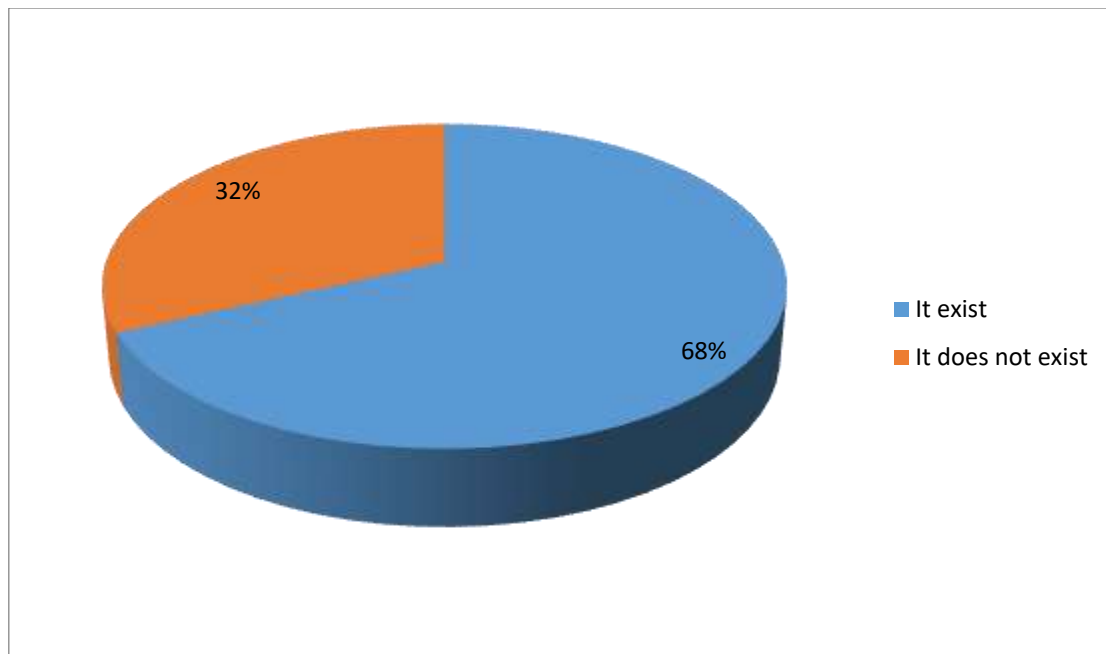


Figure 4.2 Distributions on Segregation of Sharps or Infectious Materials in the PHCs

Source: Author's Field Survey, 2021

The question of whether segregation sharps or infectious materials during waste collection exist is revealed in Figure 4.2 and it shows that majority 68% of the respondents confirmed segregating sharp or infectious waste in the

PHCs while the least 32% of the respondents had a contrary opinion as they do not segregate sharp or infectious wastes.

The reason for majority of the PHC practicing segregation of sharp or infectious wastes is because the state government and the communities are not putting in their contribution towards enhancing proper waste management when compared to others that do not practice segregation of sharps or infectious materials. These results are in line with that of Ndiaya et al (2012) that recorded absence of sorting, of medical waste at source to have (53.0%) and is regarded as high. However, Sengodan (2014) noted that effective segregation protocols significantly reduced biomedical waste generated from 2011 to 2012 in India.

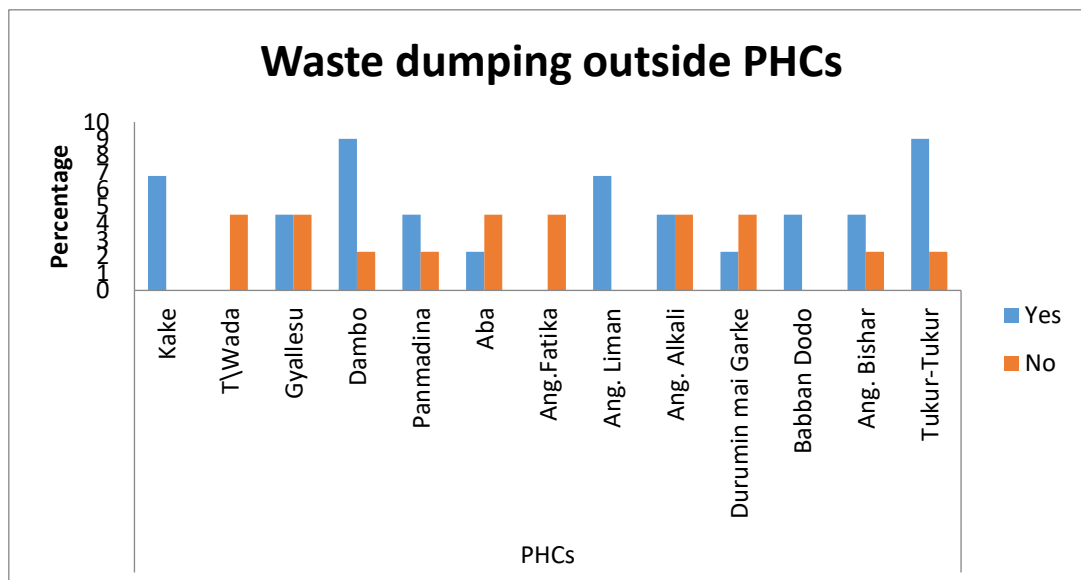


Figure 4.4 Waste Dumping Outside the PHCs in Zaria LGA

Source: Author's Field Survey, 2021

The reports obtained from respondents on the distribution of dumping of waste outside the PHC in Figure 4.4 shows that Dambo and Tukur Tukur have the highest number of respondents 4 (9.0%) that confirmed dumping outside their PHCs respectively while the least 1 (2.3%) was found at Aba and

Durumin mai Garke PHCs. Waste dumping outside PHCs is a primary concern of the management of the PHCs and the waste handlers, therefore, the practice of waste dumping outside PHCs is generally poor as many of the PHCs do not practice it, which could pose treat to patients, health personnel and general public. This is consistent with (Kuroiwa et al., 2004). Dumping outside the facility premises poses health risks to patients and people residing close to healthcare facilities infectious waste being a common sight in the hospital waste bins and hospital environment.

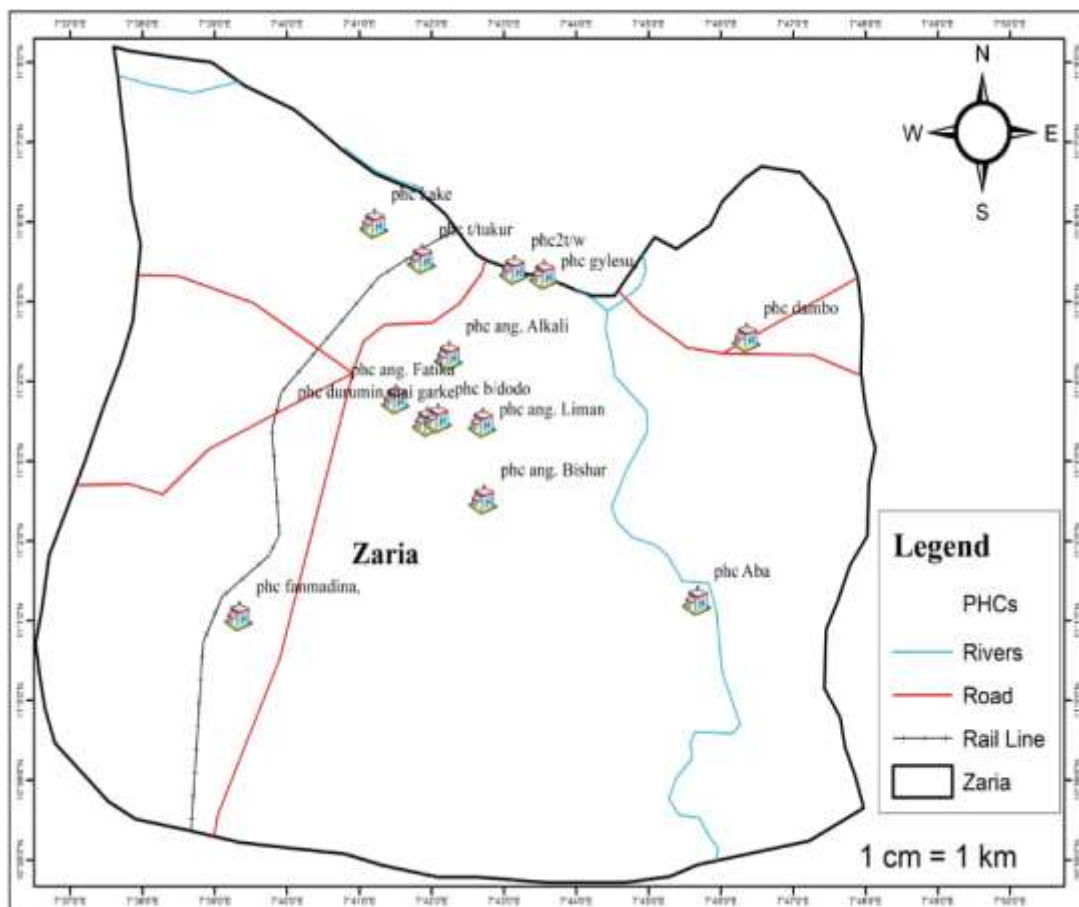


Figure 4.8: Shows the Location of the Primary HealthCare Centers in Zaria LGA

Source: Author's Field Survey, 2021

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The Coordinates of the Primary Healthcare Centers selected at Zaria local government Area

Conclusion

Proper collection, segregation, colour coding and treatment of medical waste are important. There is no enough information on medical waste management technologies and its impact on public health and environment. Proper monitoring and evaluation of medical waste management interventions should be implemented and also the need for medical waste management planning to facilitate the implementation of necessary measures to improve the present medical waste management situation.

- I. There is need for improvement in the use of receptacles and storage containers so that a comprehensive system will address the issue of medical wastes handling, storing, transporting, treating or disposing of waste to prevent health risk of personnel, patients and the general public.
- II. Ensuring waste separation, colour coding, to avoid mixed up of hazardous non hazardous and infectious waste and treatment of medical of medical waste should be done to minimize the release of toxic gases and also improve in segregation of sharps or infectious materials so as to enhance a better management of waste by waste handlers in the PHCs by the management
- III. Since more than half of the PHCs adopted incineration practice, there is need for others to do the same. The capacity to do that may not be available which calls for the attention of ministry of health to assist the PHCs with funds to enable them build incineration for a safe and healthy environment.
- IV. It is advisable to bury infectious waste. This however, means that PHCs that exposed their waste are posing threat to the environment and the public so the PHCs should desist from doing that.
- V. Movement of waste appears to be done with wheel barrow by most of the PHCs. This is not good enough compared to use of trolley and vans. The management of the PHCs should channel their complaint to the government about the inadequate waste transport system so that waste can easily and safety be transferred to dumpsites.

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