

RESEARCH ARTICLE

OPEN ACCESS

Manuscript received October 20, 2022; revised November 10, 2022; accepted November 20, 2022; date of publication December 20, 2022

Digital Object Identifier (DOI): <https://doi.org/10.35882/teknokes.v15i4.348>

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How to cite Yusuf Sarkingobir, Asiya Gidado Yabo, and Safina Abdullahi Yarima, Yusuf Yahaya Miya, Ibrahim Friday Sule, Nabil Riskuwa Bello, Abubakar Shehu, "Biomedical Waste Management among Primary Health Care Workers, Bauchi Local Government Area, Bauchi State, NIGERIA", Jurnal Teknokes, vol. 15, no. 4, pp. 242–251, December. 2022.

Biomedical Waste Management among Primary Health Care Workers, Bauchi Local Government Area, Bauchi State, NIGERIA

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ABSTRACT Biomedical waste management is a serious issue to health and environment that must be addressed at primary health care level, especially in Bauchi local government area of Bauchi state. The objectives of this study were to assess on the knowledge, methods and problems pertaining management of biomedical waste among the primary health care workers in some selected Health Care Centers of Bauchi L.G.A. of Bauchi state. Therewith, a survey cross-sectional study was utilized and sampling techniques were used to administered questionnaire and interview of the health workers at twenty (20) selected primary health centers with (200) sample respondents from public and private health care centers. Thus, it was uncovered that, the knowledge of biomedical waste management awareness among the workers was represented (94%), and only (6%) were not aware. The majority of PHC workers practiced open dumping and burning method (74%), incineration (18%), chemical treatment (7%) and only 1% for autoclave methods. While, microwaving (0%), encapsulation (0%) and sanitary landfill methods (0%) were not practiced. The problems of biomedical waste management included, improper planning (33%), insufficient funds (25%), lack of material (19%) and (15%) lack of staff training. There was improper segregation, lack of planning, lack of funds and practice of open dumping and burning, which is contrary to the biomedical Waste (Management and Handling) Rules of 2016. There was improper management of biomedical waste at primary health care level in Bauchi local government of Bauchi state. Thus, the Bauchi government should give more attention towards good plan, allocation resources, set a committee of adequate supervision, monitoring and evaluation for the sustainable biomedical waste management at Bauchi local government of Bauchi state.

INDEX TERMS Biomedical waste, incineration, infections, sharps, open burning, waste.

I. INTRODUCTION

Studies by [1][2] submitted that biomedical waste connotes every waste which is produced whenever any activity like treatment, immunization, disease diagnosis, human/ animal immunization, research work, is been carried out, and the process of making or testing biological [2]. It can also be called with different names like healthcare waste, clinical waste, medical waste etc [2]. Biomedical waste can be in solid form, liquid form, containers, bottles/ vials or any other waste produced along the course of care in observation,

diagnosis, therapy, or rehabilitation of patient. It also involves the waste disgorged during the process, production, and testing of biological which might be potentially infectious or contaminated [2]. Biomedical waste might be in many classes such as general waste, sharps (needles), IV tubing, disposal glass, pipettes, infusion sets, razor blades, scalpels, lancets, broken plastics, broken beakers or bottles, radioactive waste, infectious waste, broken glass, cytotoxic drugs, cover slips, chemicals, slides etc [1][2][3].

Parable, biomedical waste emanates from places like veterinary hospitals, veterinary colleges and the likes. Other major places that divulge biomedical waste are: research institutions, healthcare centers, hospitals, primary health centers, medical colleges, paramedic services, transfusion centers, mortuaries, autopsy clinics, and biotechnology institutions, [1]. However, there are widespread issues relating to biomedical waste management in units where they are produced, treated, or handled; such as lack of segregation, haphazard disposal, incorrect waste management or disposal, prompting great concern and consequences to health and environment [1]. Therefore, improper biomedical waste management elicits pollution of the environment, bad smell, and encourages the growth and spread of organisms that reserve microbes, as well as spread of several infections like, anthrax, polio, diarrhea, hepatitis, Acquired Immuno Deficiency Syndrome, meningitis, Ebola, influenza, typhoid and the likes [1]. People/ animals inside or outside the location where waste emanates are subjects of threat by the improper waste management, for example, doctors, nurses, technicians, waste managers, carriers, pharmacists, visitors, patients, patient relatives, and many more may be harm by improper waste management. Similarly, general public, transporters, hand pickers, waste managers might be inflicted by consequences of improper biomedical waste management [1][2].

From the epidemiological point of view, worldwide, sustainable biomedical waste management remain an issue of great concern because of its ability to pose threat and risk to the environment, humans, and animals. However, there exists gap in healthcare waste management in developing countries, and particularly in Nigeria [4]. [5] in his study in medical waste generation and handling in Nigeria, shows that the predominantly used method of waste treatment was incineration among tertiary health facilities. Most of these tertiary hospitals possessed equipment's/infrastructures for incineration, whereas, the lower health facilities have poor infrastructures for biomedical waste handling. A study conducted by [3] about management of waste gotten from health facilities, and indicators of safety in Nigeria concluded that there exists low compliance to standard management practices laid down for biomedical waste. The authors submitted the need for more training of staff on biomedical waste management, formulation of standard guidelines, and provision of adequate materials and infrastructures for appropriate waste management. Therewith, gaps exist in terms of management practices, level of awareness among managers/ handlers, the amount of waste generated, methods of disposal, and the like terms [4]. Parable, the total biomedical waste produced worldwide is projected to quadruple by the year 2025. Likewise, a study on medical waste in hospital in Kano metropolis has revealed significant awareness and knowledge on waste management practices among staff, mostly untrained staff for on waste management, low level of compliance to standard practices, and low infrastructures for waste, management [4]. Another work by [6] in Sokoto on biomedical waste management in

Gwadabawa among healthcare workers has shown that, health staff undertake poor personal protection measures against threats of biomedical waste, and lack of training on biomedical waste management is another gap found. The aim of this research study is to assess the biomedical waste management in some primary health workers in Bauchi Local Government, Bauchi State. Specific objectives are: To evaluate the knowledge of primary health care workers on biomedical waste management, to assess the methods of biomedical waste management in primary health care, and to know the problems faced by Health workers on biomedical waste management in primary health care. This study will unveil data regarding biomedical waste pertaining health care centers Bauchi, a state that lies in the North Central, where there has been paucity of reported data on biomedical waste. In the other sense, it will reveal the level and source of knowledge among the health workers; likewise, the infrastructural capacity of the facilities in question and the methods involved at the level of low income settings which has not been reportedly examined in the past.

II. MATERIALS AND METHODS

This chapter deals with the research design, study is, research survey, sampling technique, method for data collection and method of data analysis.

A. RESEARCH DESIGN

Research design has to do with the plan of the study; alternatively, a total outline of how to carry out the work, thus, it entails the roadmap that decipher the collection of data in a study so as it can be analyzed to solve a given issue or problem or research questions. Research study describes a way attempting to gather information about inhabitants of a given population, with respect to one or more variables. Based on the above definition, this research work is a study which design to assess the biomedical waste management among the primary health care workers in Bauchi local government area of Bauchi state. The cross-section research study will be used and most appropriately to the survey design.

B. STUDY AREA

The research study area is department of primary health care, Bauchi local government, Bauchi state, a metropolis that hails from northeast region of the country, it is the capital of [Bauchi State](#). It is located at an elevation of 616m and between latitudes 9° 3' and 12° 3' north and longitudes 8° 50' and [11° east](#). The Local Government Area covers an area of 3,687 km² and had a population of 493,810 at the time of the 2006.

It is located in the South West senatorial Ward. It shared boarded with Ganjuwa L.G.A by the West, Tafawa Balewa L.G.A by the North, Dass L.G.A by the North, Toro L.G.A by East Alkali. The projected total population of Bauchi LGA according to 2006 Population census was 493,810. Major occupations: Agriculture, livestock rearing, commercial activities and civil service. Languages: Hausa,

Fulani and Garawa, are the main languages of populace of Bauchi local government area.

Bauchi Local Government have the total number of Twenty political wards (20) namely: Dan Amar ‘A’, Dan Amar ‘B’, Dawaki, Birshi, Dandango, Makama ‘A’, Makama ‘B’, Tirwun, Hardo, Zungur, LimanKatagum, Dankade, Kundum Durun, Miri,Dan‘iya, Mun-Munsal,Kangere, Yamrat, Gwaskwaran and Galambi Wards, and it consist (1723) settlements with (138) health facilities and (512) professional staff. Primary Health Care Department in Bauchi, which co-ordinates all Health activities in the LGA, and have seven units namely: Immunization unit, Health Education and promotion unit, Water Sanitation unit, Maternal and Child Health/Family planning Unit, Essential Drugs and supply Unit, Monitoring Evaluation Unit and Diseases.

C. RESEARCH INSTRUMENT

The questionnaire (for the study participants and for visual inspection) was designed to meet objectives of the research. There are two sections in the questionnaire for this work. The first section of the questionnaire was personal data of the respondent and the second section of the questionnaire was research questions about the assessment of biomedical waste management among the primary health care workers.

D. SAMPLING TECHNIQUES

Any part or parcel of the whole population taken by the study to represent the whole is described as the sample, therewith, a way and method to draw that sample is regarded as sampling technique. This research work was carried out among (200) respondents selected by means of sampling technique. The questionnaires were distributed within the primary health workers, (10) respondents randomly selected from each of the twenty (20) health facilities.

E. METHOD OF DATA COLLECTION

Two hundred and five (205) questionnaires were printed and applied upon primary health care workers, but the two hundred (200) copies were completed, returned and analyzed for research purpose. Ten (10) primary health care workers were selected for questioning on their knowledge and practice towards biomedical waste management in the research area. Almost all the staff selected for the interview were delighted for being involved, this has assisted to know their basic knowledge, facilities available and method they practice. An inspection of the facility premises was ensured and documented as well.

F. METHOD OF DATA ANALYSIS

After gathering the data, an analysis was undertaken to give simple percentage, with descriptive values and presented in form of table and statistics charts. The software used to analyze the work is Statistical Package for Social Science (SPSS) version 21.0.

III. RESULTS AND DISCUSSION

This part deals with results based on questionnaires and interview from primary health care workers on assessment of biomedical waste management at twenty (20) sampled health centers: PHCC Tashan Babiyee, PHCC Liman Katagum, PHCC Tudun Gambo, Infectious Disease Hospital Bayara, PHC Gubi, PHCC Durum, PHCC Kofar Dumi, PHCC Bayan Fada, PHC Doya, PHC Tirwun, PHCC Wuntin Dada, Kobi HP, PHC Gwaskwaran, PHCC Dawaki, PHCC Gudum, PHCC Yuduga, PHCC Yamrat, Bidolo HP, PHCC Miri and Alfurqan Hospital Bauchi LGA of Bauchi state.

A. DATA PRESENTATION AND ANALYSIS

Tables and figures were generated to illustrate the findings of this study.

TABLE 1
Gender Of Respondents

Gender of respondents	Frequency	Percentage
Male	140	70
Female	60	30

TABLE 1 in this study has uncovered a 70% of the respondents were males and 30% were females. There are more males’ health workers in the health care centers used for this research.

TABLE 2
Age Of Respondents

Age of respondents	Frequency	Percentage
15-25 years	52	26
26-35years	64	32
36-45 years	60	30
46 years and above	24	24

TABLE 2 is presented to outline the age of subjects, therewith, better portion among the subjects fall in the groups of 26-35years and 36-45years with the percentage of 30% and 32% respectively. The age range of 15-25years has 26%, while the less respondents fall between the ages of 46years and more.

TABLE 3
Showing Marital Status Of Respondents

Marital status	Frequency	Percentage
Single	44	22.0
Married	150	75.0
Divorced	6	3.0
Separated	0	0.0
Total	200	100.0

TABLE 3 shows indicates (75.0%) of the participants are married, while (3.0%) of the study subjects are divorced and (22.0%) are singled.

TABLE 4
Showing The Occupation Of Respondents In This Study

Occupation	Frequency	Percentage
Staff	166	83.0
Students	24	12.0
Others	10	5.0
Total	200	100.0

TABLE 4 shows 83.0% of the participants are full staff, 12.0% of the respondents were students and only 5% were others.

TABLE 5
Showing Education Level Of Respondents

Occupation	Frequency	Percentage
Primary	0	0.0
Secondary	22	11.0
Tertiary	168	84.0
Others	10	5.0
Total	200	100.

TABLE 5 shows that majority of total answerers (84.0%) have attained tertiary level, (11.0%) of the respondents' also attained secondary school, while 5.0% of the respondents attained other schools and no primary school certificate level.

TABLE 6
Showing Knowledge Of Biomedical Waste Management Among Respondents

Knowledge of biomedical waste management	Frequency	Percentage
Yes	188	94
No	12	6
Total	200	100

TABLE 6 shows that, majority of the recruits have the knowledge of biomedical waste management, representing 94% of the total respondents, only 6% of the respondents do not have the knowledge of biomedical waste management

B. RESULTS OF INTERVIEW

TABLE 7
Source Of Information About Biomedical Waste Management.

Source of information pertaining biomedical waste management	Frequency	Percentage
Staff training	126	63
School	58	28
Media	8	4
Others	8	4
Total	200	100

TABLE 7 Indicates that 63% from the total respondents know about biomedical waste management through staff training, 28% known from school, while 4% from the total respondents got information through the media and remaining 4% known from other sources.

TABLE 8
Showing Some Healthcare Centers In Bauchi Local Government And Their Waste Management Indicators

No	Health centres	Type of biomedical waste generated	Segregation practice	Method of disposal	Agent for disposal
1	Infectious disease Hospital	Anatomical , sharp, microbial waste and drugs	Segregation	Incineration	Government
2	PHC BAYARAN	Immunization sharp, microbial waste	Segregation	Open dumping, burning and autoclave	Government
3	PHC KUSI	Contaminated cotton, syringe needle	Poor segregation	Open dumping and burning	Government
4	PHCC DAWAKI	Anatomical , sharp, microbial waste	Segregation	Incineration and chemical treatment	Government
5	KOBI HP	Immunization and contaminated cotton	Poor Segregation	Open dumping and burning	Government
6	BIDOL OHP	Anatomical and microbial waste	Poor Segregation	Open dumping and burning	Government
7	PHC KOFA R DUMI	Sharp waste and drugs	Segregation	Chemical treatment	Government
8	PHC Gubi	Anatomical , sharp, microbial waste	Partial Segregation	Open burning	Government
9	PHC Gwaskwaran	Anatomical	Partial Segregation	Open dumping and burning	Government
10	PHCC Durum	Sharp waste and drugs	Partial Segregation	Chemical treatment	Government
11	PHCC Tudun Gambo	Anatomical , sharp, microbial waste	Segregation	Chemical treatment	Government
12	PHC Doya	Anatomical , sharp, microbial waste	Segregation	Incineration and chemical treatment	Government
13	Alfurqan Clinic	Microbial waste	Partial Segregation	Open burning	Government
14	PHCC Liman Katagum	Anatomical , sharp, microbial waste, drugs	Segregation	Chemical treatment	Private clinic
15	PHC Tsauna	Anatomical , sharp, microbial waste	Segregation	Incineration	Government
16	PHCC Tashan Babiye	Anatomical , sharp, microbial waste	Segregation	Chemical treatment	Government

17	PHCC Yamrat	Immunization and contaminated cotton	Segregation	Incineration	Government
18	PHCC Yuguda	Sharp waste and drugs	Segregation	Chemical treatment	Government
19	PHCC Miri	Anatomical, sharp, microbial waste	Segregation	Incineration and chemical treatment	Government
20	PHCC Gudum	Immunization and contaminated cotton	Segregation	Incineration	Government

TABLE 8 shows that majority of health care centers (20) generated anatomical, microbial, discarded drug and sharp waste. The methods they were practicing are open dumping and burning only two healthcare centers practiced incineration method and chemical treatment. Partially and Poor segregation were practice observed in all health care centers. The government is an agent responsible biomedical waste management all health care centers expect for Alfurqan Clinic where the hospital authority is responsible for their waste management.

TABLE 9

Type of Biomedical Waste Generated Among Health Facilities In Bauchi Local Government, Nigeria

Type of biomedical waste generated	Frequency	Percentage
Waste sharps	80	40
Human anatomical waste	70	35
Discarded medicines	24	12
Others	26	13

TABLE 9 shows that the biomedical waste generated mostly in the health care centers of Bauchi L.G.A. are majority waste sharps with (40%), followed by human anatomical waste (35%). Other categories discarded medicine (12%) and others constitute the remaining 12%.

TABLE 10

Practice of Biomedical Waste Segregation By Respondents

Response	Frequency	Percentage
Yes	56	28.0
No	154	77.0
Total	200	100.0

TABLE 10 indicated that majority (77.0%) among the recruits were not practicing biomedical waste segregation, only 28.0% among the subjects were practicing biomedical waste segregation out of 100% of total respondents.

TABLE 11

Showing Management Of Biomedical Waste In Primary Health Care Centres In Bauchi Local Government, Bauchi State, Nigeria

Response on practice of biomedical management	Frequency	Percentage
Yes	186	93
No	14	7
Total	200	100

TABLE 11 shows that 93% of the primary health care workers are practicing management of biomedical waste at their primary health care facilities and only 7% of the respondents are not practicing.

TABLE 12

Showing Methods of Disposing Biomedical Waste Generated In Primary Health Care Centres In Bauchi Local Government, Bauchi State, Nigeria

Methods of disposing biomedical waste generated	Frequency	Percentage
Open dump and burn	148	74
Incineration	36	18
Chemical treatment	14	7
Autoclave	2	1
Microwave	0	0
Encapsulation	0	0
Sanitary landfills	0	0
Total	200	100

TABLE 12 shows that majority (74%) of the respondents were practiced open dumped and burn, 18% of the respondents were practiced incineration, while 7% chemical treatment, only 1% for autoclave and the remaining 0% others method.

TABLE 13

Showing The Gent Responsible For Biomedical Waste Management In Bauchi Lga, Nigeria

Agent responsible for biomedical waste management	Frequency	Percentage
Government	186	93
Private	14	7
NGOs	0	0
Others	0	0

TABLE 13 shows that majority of the biomedical waste from Bauchi LGA is managed by the government (93). Only 7% are managed by private agency.



(a)



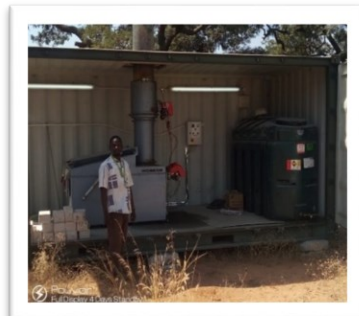
(b)



(c)



(d)



(e)



(f)



(g)



(h)



(i)



(j)

FIGURE 1. (a) Showing Bauchi NPI officer, (b) Showing PHC Kofar Kudu, (c) Showing PHC staff filling questionnaire, (d) Showing some PHC staff filling the questionnaire, (e) Showing waste treatment plant, (f) Showing a gathered waste in an open dump, (g) Showing an incineration machine, (h) Showing an incineration taking place, (i) Showing Bindolo Dump site, (j) Showing Kusi Dump site

TABLE 14
Showing Major Problems Of Biomedical Waste Management

Major problem of biomedical waste management	Frequency	Percentage
Improper planning	66	33
Insufficient funds	50	25
Lack of materials	38	19
Lack of staff	30	15
Lack of manpower	16	8

TABLE 14 shows that the major problem encountered in managing waste that is of biomedical type in Bauchi primary health care centers, were improper planning (33%), insufficient funds (25%), lack of materials (19%) and (8%) lack of staff training.

IV. DISCUSSION

From results, based on gender, majority of respondents were male (70.0%) and only (30.0%) were female and it was visible that most subjects fall within the groups of 26-35years and 36-45years with the percentage of 30% and 32% respectively (FIGURE 1). The age range of 15-25years has 26%, while the less (24) respondents fall between the ages of 46years and above. This shows that majority of the respondents were of working class. Results of marital status shows that (75%) of the respondents were married, while (3%) of the participants were divorced and (22%) of the respondents were single due to the location at the Northern Nigeria and where early marriage is being practice and also as the result to level of literacy and religion influence of respondents. Based on occupation shows that (83%) of the answerers are full staff, (12%) of the respondents were students and only (5%) were others. It was found that majority of total respondents (84%) have attained tertiary level, 11% of the respondents also attained secondary school, while 5% of the respondents attained other schools and no primary school certificate level.

Assessment on biomedical waste management shows that majority have the knowledge constituted (94.0), only (6.0%) were not aware, but their major source of information was staff training that (63%), (28%) while media and other source played a very little role total (4%). This is the study area that can be at primary health care level practice and is encouraged. This was similar to the assessment on biomedical waste management by [7] in Bahir Dar, Ethiopia. Biomedical waste generated mostly in the primary health care centers of Bauchi L.G.A. were sharps with (40%), followed by human anatomical waste (35%). Discarded medicine (12%) have and other categories like microbial waste, constitute the remaining (13%). Similar assessment result was reported on biomedical waste generated in Ajmer city, India by [1]. It is worrisome to discover that most of the healthcare centers produced sharps and anatomical waste, which can transmit diseases; but the producers handled it through open dumping and burning. Open dumping aid transmission of infections and occurrence of chronic

diseases, while burning kill the microbes but tend to be insalubrious to health [6].

Moreover, assessment of the result also shows that primary healthcare workers are not practicing proper biomedical waste segregation; only 28.0% of the respondents are practicing biomedical waste segregation out of 100% of total respondents which is against the biomedical waste management and handling rules. Poor or partial segregation is another problem associated with waste in the study area, a similar finding to [6] from Sokoto state, Nigeria. It is a trend that mixed the various types of wastes, and in turn lead to poor safety and management. Lack of segregation highly influence waste safety and management [10].

The majority of the primary health care staff (74%) practiced open dumping and burning, while (18%) of the respondents practiced incineration, also (7%) chemical treatment, only (1%) for autoclave. Similar assessment was conducted by World Health Organization in 2014 from the entire world level, 18-64% of health care locations, have been documented for having unsafe handling of biomedical waste due to some factors like poor awareness. Every year, about 67,740 health locations in African region cumulatively make about 282,447 tons of medical waste yearly [7].

Majority of the respondents (93%) said government or agents supposed to be responsible for the biomedical waste management in the study area, while only (7%) was handled by private agency. The result listed problems of improper planning (33), insufficient funds (25) and material constituted (19%), similar assessment was done among the primary health care staff shows, inadequate training, insufficient resources and poor disposal of biomedical waste. That has to bring insects, rodents, dogs, cats, flies, and the likes in the health locations due conspicuous and scattered waste over the surrounding; an event that would positively help in the spread of communicable infections, as well as chronic problems [6].

According to [1], knowing the how much waste is produced, and categorizing it into various classes, then segregation, are vital strategies and norms that are imbibed in the course of treatment and management of waste in an appropriate fashion. [1], reported that the participants do not have zero awareness pertaining the amount and how much waste made in the different health locations (140%) out of 157 agreed that they do not label the infectious waste with the biohazard symbol. Lack of knowledge of infectious waste among staff, and other sanitary staff, cannot be absolved from been behind this trend [6]. However, some findings of this study, have shown a greater training on biomedical waste management among staff, which is a good omen and in contrast to a study by [6] from Sokoto.

Management of waste has been a crucial difficulty for countries of the world and especially those that are coming up. Huge amount of waste is produced through the parts of the world. However, problem in most of the cases problem arises in the ability of the producers and consumers to effectively manage that waste for continuous balance and safer existence of mankind and other organisms [8]. The

issue waste management is a problem in Nigeria like other countries. Therewith, all the states or regions of the countries are facing the problem of the waste management issues. A trip to some cities in the country, like Lagos, Ibadan, Kaduna, Aba, Kano, Sokoto and the likes will signify that waste is a threat everywhere in the country. In the local governments of the country, the situation of waste problem is still daunting as in the cities or states. [9,10,11]. In this vein, healthcare serves as sector that uses much energy and produces much waste which contributes to health problems, environmental issues craving for urgent understanding, policies, and implementation to minimize negative outcomes [12].

The disadvantage and implications of unsafe and poor biomedical waste management are many. An infectious waste which is mostly disgorged from health-related facilities is in some parts infectious containing viable microbes or their products which causes diseases, infections in animal or humans. In turn, it spread microbes like viruses, bacteria, prions, protozoans; as well as, propagates dioxins, particulate matter, and other harmful chemicals within the environment. Consequently, leading to serious health problems and diseases like dysentery, diarrhea, acute respiratory disease, hepatitis, asthma, cataract, malaria, polio, typhoid, and the likes [11] [12] [13] [14] [15]. Additionally, infectious waste can lead to contamination of all forms of environment, namely, air, water, land, leading to entire ecosystem imbalance [18,19].

Waste in soil or water causes pollution of soil and water respectively and reduces fertility of soils in turn leading to high levels of N, P, and K; high levels of toxic metals, which can contaminate the plants with detectable toxic elements levels. It can also spur destruction of soil and water microbes [20, 21, 22, 23]. In the similar vein, the improper management of waste through open dumping, and landfilling releases 17% of the global methane emission. Methane and other gases released can cause fire, explosion due to their combustibility. Methane and carbon dioxide affect skin, eyes, noise, and respiratory system at large. Open dumping can harbor vectors, rodents, flies, mosquitoes, vector-borne diseases (like dengue, malaria, intestinal worms, hepatitis, leptospirosis). Landfills serve as sources of dust, odour, and noise pollution. Landfill and open dumping are sources of leachate (especially during rainy season). Other common improper management of waste is through burning, in turn respiratory diseases, inflammation, anaemia, breathing difficulty, low immunity, asthma, allergies, and the likes can be spurred [24, 25, 26]. Looking at the figures shown in the results of this study, there is noticeable presence of plastics and papers in the discarded waste. This is not a new thing, as plastic are in many uses in the hospitals; whereas, the plastics are associated with varied environmental and health effects due to their latent hazardous chemistry. Plastics in particular, contain chemical contaminants called additives and other xenochemicals which are toxic and leak from the parent products during usage, recycling, or management (appropriately or inappropriately) or burning/ incineration. When waste is burnt, plastics disgorge toxic chemicals such

as dioxins that can damage immune system, reproductive system [27]. Thus, there is need to make more studies and put all hands on deck to save management of biomedical waste in the state, so that to save public health against pollution.

V. CONCLUSION

According to what was determined by this work, the trend of managing biomedical waste in the study locations has been treated with hesitancy; there is basically poor attention been given. The issue is still being neglected by the private and public stakeholders as well, since there was unsatisfactory and inefficient segregation, lack of planning, lack of funds and practice of open dumping and burning, which is conflicts with the biomedical Waste (Management and Handling) Rules of 2011 and create hazards to health and the environment. Inappropriate handling and treatment of hazardous waste, and paucity of incinerator devices, and low quality of operation are all evidently conspicuous. Moreover, it will be better to add up, biomedical waste management in the course of normal and prescribed training, capacity building, continuing education pertaining staff and facilities of health locations. Equally, managing and evaluating a health facility shall be run with the strategy for biomedical waste management among staff and leaders. Finally, based on assessment it can be concluded that there was improper biomedical waste management at primary health care level in Bauchi local government of Bauchi state. Therefore, the government is implored to look into this area and provide a lasting solution to the biomedical waste management because of its hazardous effect on life and the environment.

V. RECOMMENDATION

Pertaining what was uncovered in this work, it is pertinent that stakeholders shall provide good plan for proper biomedical waste management at primary health care level; and increase on the awareness and mass campaign on the biomedical waste management. There is also need for government to set a committee of adequate supervision, monitoring and evaluation biomedical waste management. Moreover, there is need for primary health care management board to allocation resources to the health centers for proper biomedical waste management. Indeed, it is further befitting to seek for research should in order to find more solution to problems faced on biomedical waste management. There is need for further studies on ways to tackle the issues of biomedical waste management from the studied locations and the country at large.

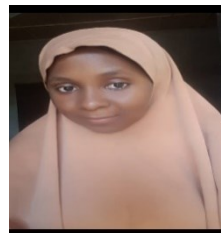
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