



NEAR EAST UNIVERSITY
INSTITUTE OF EDUCATIONAL SCIENCES
ENVIRONMENTAL EDUCATION AND MANAGEMENT

POULTRY WASTE DISPOSAL IMPLICATIONS AND ITS
ENVIRONMENTAL AWARENESS CHALLENGES
IN LIBYA

MASTER THESIS

Hasan Aflah Saeid ALSAKKOUH

Nicosia

May, 2019



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May, 2019

Nicosia

ABSTRACT**POULTRY WASTE DISPOSAL IMPLICATIONS AND ITS ENVIRONMENTAL
AWARENESS CHALLENGES IN LIBYA****Hasan Aflah Saeid ALSAKKOUH****Master's Thesis, Major Field of Environmental Studies and Management****Thesis Advisor: Prof. Dr. Şerife GÜNDÜZ****May 2019, 80 pages.**

Environmental pollution and contamination omit by irresponsible disposal of poultry waste has been one of the environmental challenges of Tripoli, Libya. This study aimed at assessing the various challenges confronting the public environmental awareness on improper disposal of poultry waste. Quantitative data analysis through the use of questionnaires was adopted for this study. The questionnaires were distributed to farmers within the Libyan province.

From the findings of the study, we discovered that over 10 kg of waste is generated in most of the poultry farms in Libya per day. However over 73.4% of farms do not have storage receptacle for poultry waste. This shows that the main problems encountered with poultry storages include; awful smell and complaints from neighbors. Based on the issue of media and awareness, a majority of people with a frequency of 200 strongly agree that media does have a great role in creating awareness on environmental matters. Furthermore, a majority of the population with a frequency of 257 reported that they have not had a chance to be thought by environmental educators with a percentage of 73.4%. These findings reveal that farmers in Libya are less informed on the proper ways to manage the poultry waste generated from their farms.

Hence this study generalizes that media and government agencies in Libya have failed in creating awareness on proper poultry waste management and therefore it is the major factor contributing to the improper management of poultry and other solid waste in Libya.

Key Words: Libya, environment, poultry waste, environmental sustainability, environmental education, environmental awareness

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ABBREVIATIONS

CHP: Combined Heat and Power

EAA: Environmental Assessment Act

EC: European Commission

EU: European Union

EPA: Environmental Protection Act

F: Frequency

GHG: Greenhouse Gases

ISWM: Integrated Solid Waste Administration

LFG: Liquefied gas

MSWM: Metropolitan Waste Management

Sig: Significance

SPSS: Statistical Package for Social Sciences

UNEP: United Nations Environment Program

UNHABITAT: The United Nations Human Rights Program

UNEP: United Nations Environment Program

UNHABITAT: United Nations Human Settlements Programme

WDA: Waste Diversion Act

WDA: Waste Diversion Act

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CHAPTER I

INTRODUCTION

Contamination and strong waste are among the most essential natural issues of Benghazi city and, in addition, interesting urban zones and urban areas in Libya. These issues are brought about by the avoidance of common guidelines and huge natural association. Ecological guideline is basic to show the improvement of nature-ensuring errands. In this sense, the technique of acing ought to be characterized by authoritative systems. In Benghazi, as in all other city systems in Libya, there is contamination because of absence of desire and common association (Omran, 2013). In spite of the social and budgetary limitations on egg, meat and ranch generation, these homesteads keep on making ecological dangers to people and creatures and cause water/soil and air contamination. These squanders are created as hatcheries, hairy creatures, litter and further passing. So as to decrease the danger to the welfare of poultry and to diminish the power of the family units in the locale, poultry ranches should see and regard a 1 km a winged unit and change them at a more prominent separation. Private houses are inner and systematic and furthermore watch an uncommon request to control spending (Akanni, 2014).

Poultry is a standout amongst the most generally consumed foods in Libya. With no doubt, the advancement of the poultry business started because of the high generation conditions for essentialness and protein, the quick turnover rate, and the short preparing time (e.g.21 days) that concentrated on poultry dependent on different creatures raised by different creatures (National Planning Council, 2009).

1.1. Problem statement

Metropolitan Waste Management (MSWM) is a vital segment of the urban ecological association. The attributes and benchmarks that rise up out of home, business and current practices in a zone are not only the aftereffect of a creating populace and the augmentation of the way of life and the improvement of advancement, but also the effect of riches and nature of the customary property in the local district. This problem is evoked by the advance of the current population through changes in the management of

industrial and agricultural waste which is a necessary component of urban environmental planning. The qualities and standards of waste that arise from residential, commercial and industrial activities in an area are not only the effects of a developing population and the diffusion of lifestyles and the promotion of innovation, but also the abundance and classification of the natural resources of the districts (Zhang et. al, 2010).

This distinction is because of the advancement of present day individuals as a result of the adjustment in current and present day urban communities, including the improvement of different businesses, for example, liquid, water and gas. . Solid waste, including household, and soil contamination, is the most common waste. Adaptable deposits contain sully soil for the fundamental segments (soil, water, air) in various fixed parts and the degree of the materials and segments and properties, materials and hostile to lethal substances (Dauda et al., 2019).

Careless misuse of waste along these lines can cause some ecological issues. In the present circumstances, squander contrasts from bigger issues make the situation unpredictable as a result of some wastes (Alshriane et. al, 2003).

Genuine waste issue is a noteworthy issue in numerous urban areas in Libya, including Benghazi. The crusade in this city keeps on developing as various managerial administrations, focuses and stops have expanded. Likewise, the population of Benghazi keeps on increasing because of the birth and living arrangements of urban and rustic occupants (Gebril, 2011).

Solid waste is a consequence of human life style and the exchange of waste ought to be dependable on individual joy. The real segments of the strong waste administration framework purpose of return contamination from the living region as a method for general help. For the danger of undiscovered administration, measures have been taken and are critical in the utilization of secure sanitation offices (Gebril, 2011).

Exorbitant disintegration are significant drawbacks in Benghazi and in every one of the urban communities of Libya. These issues are because of absence of the executives and ecological administration. Creature supplies are vital to improve soil preservation endeavors. Consequently, the arranging procedure ought to be sorted out by

the administrative procedures. Neighborhoods research should address the reasons for consistent measles in Benghazi and its territories, just as certain recommendations that will encourage the execution of SVM and characteristic cultivating association and the board to address genuine waste contamination (Omran, 2013).

Growing hens are used: soil protection, litter (decorated materials, egg trees, shavings, grass and mice or rice tips) and deaths on the farms. The chickens produce some waste materials, including materials (materials, bodies and bodies of infected birds), floods and basins. Most of these forces can provide natural and non-potential material, which is refinanced and refined without paying any attention to the fold. As long as it is, they are also treated to cause environmental problems and human problems related to nutrient sources, calories (including antibiotics), insect probes, parasites and pathogenic microorganisms. With the potential likelihood of advanced drugs, these components will be supplemented for small herds, including domestic shepherds, who may have some basic characteristics. Working with these adverse effects, such as severe disease, is crucial for high intensity flood problems and sometimes soil quality issues (Brandelli, Sala and Kalil, 2015). Issues included in the list are the immediate damage to nearby water sources as a result of a larger collection of additions such as nitrogen and phosphorus (and potassium in areas). The accumulation development in remote areas of the country is limited in the area and affects various types of worthwhile and significant benefits that extend to living conditions in the area. The term is extremely advanced from the design for the production of animals and eggs, with the maximum expectation that the product will be transported to meet the animal content. This often consumes no less food, and physical or health problems can occur if the ingredients' base material presents the potential for energy consumption or how poorly the control balances the risk of decay due to the home evening or home washing of the house in the rain (Gundersen, 1992).

In addition, many urban centers are constantly growing on floor slices in one year from the perceptible year of loss of the highest possible defect or smaller seed. Many defective types of waste can produce seeds that can be processed or processed in compost for agricultural cultivation. Strongholds of high-risk urban waste in the

metropolis have shown that the best home is an advantage. However, they decide how soil can be strongly rooted when heavy, unnecessary waste is used to sell their seeds (Are et al., 2017).

1.2. Aim of the study

The main objective of this study is to assess factors challenging public environmental awareness on the implication of improper poultry waste disposal in Libya.

1.3. Rationale

The effect of chicken and other harmful effects on local and local areas actual diseases and soil damage are typical remedies found in the poultry sector. Soil and water disturbances include additional nutrients, pathogens, and materials that are caused by poor waste management and are stored. Farmers are not repaid on damaged land or poultry or on the market. The poultry material is a source of soap and other pests that cause local and infectious diseases. Extensions ranging from the maximum number of condensed constituents with alkali (NH_3), natural substitutes (VOCs) and hydrogen sulfide (H_2S), from chicken poultry affect the lives of people living in the area.

Fish is becoming more stressful for areas in the near future. The Ohio Health Survey has shown that anomalies in residential buildings within a milestone correspond 83 times to the number of flies and mosquitoes that can cause symptoms, for example, disorders, malnutrition, diarrhea, pandemic, filarial and decay dengue. Their problems are particularly well known in feed management. The taste suggests that chicken poultry may be added to water quality issues in areas where it has become flooded or underwater pellets. The most important thing that happens is that the activity is at groundwater level. In the same way as other preservatives, reliable hygiene and good management in preparation for excessive fluid and low costs of other years, higher biochemistry and oxygen (BOD and COD), because approaching natural materials, for example, blood, fat, nutrients and treatments, that allow you to take the lowest levels or even the harmful effects of marine life. Colleges of metal producers, for example chlorine, which are used for washing and decomposing and in addition to other pathogens with Salmonella and

campylobacter, can also be introduced into water. In addition, water systems can contain worthless amounts of nitrogen and phosphorus, which can lead to the formation of liquid water (Maheshwari, 2013).

The impact of poultry on the environment is not limited to many areas. They also add the effects of the global recommendation. The two main points are: A vision of focus and ozone that creates the design of an identifier with particular utility for the reproduction of living things and for the packaging of the material. The brutal killing of poultry in recent years has been stabilized by the use of automatic focusing. Even corn and yeast diagnosed in 2004 were used as a catalyst for commercial products (Maheshwari, 2013). It is very productive and contributes to the transformation of the alkali effect of nitrogen from nitrogen compost. Cases that produce the most commonly used substances. Ero-Dioxide nutrients that result from the use of organic products in living organisms, air, transfer of controlled substances and refrigerators, and even deforestation. Delicious nitrous water, supplied from nitrogen compost. FAO-IFA (2001) announced 1 percent N_2O-N (nitrate nitrate) (Maheshwari, 2013).

1.4. Significance of the study

Dry chicks like litter or cow can be used for many reasons, as you need animal feed. Reproduction of animals such as lime cotton or manure, which has been used as animal ingredients for many years. These foods contain many minerals, power and protein. They are usually used within the state or province in which they were performed because they have no valid calculation to take such a large application. In most of these brands, the farmer's farm is an additional supplementary.

1.5. Limitations

The limitations of the study are stated below:

- The study was limited to 350 farmers residing in Tripoli, Libya.
- This research was limited to only farmers around Tripoli
- The resources were restricted

1.6. Assumptions

1. The farmer's awareness in the Tripoli shows their knowledge about poultry waste disposal implications and the impact on environmental
2. It is approved that the farmers participated in the research are qualified.
3. Answers given by farmers for the questionnaires are sincere.
4. Related literature obtained for this study is assumed to be sufficient.

1.7. Definitions

- **Waste:** Wastage is the equivalent, the sort of waste transfer and as a method for managing it or being ousted is a finished issue. The waste additionally alludes to "the materials, a material or texture that you see as an advanced and in a specific region as useless"(Dauda et al., 2019).
- **Lethal waste:** It alludes to substances, both physical and fluid, which can be harmful to people and the earth. Extraordinary measures and cleaning are executed (Cave, 2010).
- **Recycling waste:** Reusing implies decreasing the measure of flotsam and jetsam being transported. Models incorporate reprocessing and reusability of substances that can be separated (Cave, 2010).
- **Hazardous waste transfer:** Squander requiring exceptional treatment, other than remaining waste, to avoid natural contamination; These incorporate asbestos, creature corpses, mechanical waste and radioactive materials (Cave, 2010).
- **Agriculture:** It can be referred to alternative agriculture, biological farming and ecological farming that require no artificial inducers or materials like fertilizers, genetically modified crops and chemicals for pests, diseases and insect control (Dauda et al., 2019).

- **Awareness:** is defined as the ability to make forced-choice decisions above a chance level of performance. The second definition, proposed by Henley (1984), is subjective and simply equates awareness with self-reports indicating that an observer "consciously sees" a stimulus.

CHAPTER II

LITERATURE REVIEW

Sometime in the past, simple to utilize technology ended up as a standout amongst the most vital improvement needs on the planet. Despite the fact that the idea of feasible development is developing old in the late eighties, there is no immediate perspective on this marvel (Rodić et al. 2010). By the way, there are a great deal of accord among journalists about the way that any economy is embraced by a worldwide spending plan dependent on (money and contaminant take-up) and that feasible improvement is just conceivable whenever completed (Rodić et al., 2010)

Diverse activities - financial, natural and human rights - are accomplished (Boggia et al., 2010). The plant delivers a decent yield for shoppers and advantages for makers. It makes financial chances and adds to the improvement of the territorial economy the initial two areas (financial and social) of the sponsorship. Notwithstanding, the increment, security and extension of the ranch associates with some ecological fiascos (Rae et al., 1999).

The post is progressively observed as not earth neighborly but rather likewise unpleasant (with "Hard Response" model) or main thrust (in the "Driving Power-Pressure Response" structure) (Rodic, 2009). Therefore, present-day makers are under extreme strain to lessen the effect of their production nature.

2.1. Disposal of waste materials

Waste is the equivalent to the sort of waste transfer and as a method for managing it or being ousted finished issue. The UNEP (United Nations Environment Program) portrays as complimentary or things that will be disregarded or can't avoid being or will require as a national law. The waste additionally alludes to "the materials, a material or texture that you see as an advanced and in a specific region as useless" (Mugambwa, 2009). The waste is an influential thought, which can be portrayed independently, by a ton of freeware subtleties that are brought into the purported "PSSP Plasma". PSSP speaks to the reason, structure, area and usefulness of the trademark "Frequently, the meaning of waste-dependent on the sort or class of waste amidst the

world flourishes kinds of waste include: city squander, strong waste, waste and trash squander.

2.1.1. Municipal waste

Cointreau Levine et al., (2000) allude to civil waste "signifies any loss from private, business, institutional, modern and city sources, however without precipitation, aside from where blended with strong waste". Notwithstanding, it ought to be borne as a top priority that it is troublesome or even unfeasible to define a limit among dung and strong waste. Much of the time, strong waste blends with waste, making a potential danger for human wellbeing.

2.1.2. Solid waste

Strong waste, additionally called decline, does not vary significantly from civil waste. This examination takes the meaning of the condition of the report condition for Uganda, in strong waste "utilized by families just as business, institutional and mechanical exercises out of the blue to acknowledge natural and inorganic waste," I figured it savvy to embrace a definition and significance of strong waste with regards to the examination (Mukisa 2009).

2.1.3. Waste treatment

Characterizes waste management as a "gathering, transportation, handling, reusing or transfer of waste material." Waste treatment forms contrast from industrialized nations to non-industrialized, local and urban communities, lodging and assembling makers. The measure of stores in the above territories will show that squander the board is extraordinary. Since the practices are unique, this would imply that the utilization strategies were additionally extraordinary, as applying an activity in a situation in another condition would not be proper. Along these lines, it must be painstakingly viewed as where the waste originates from to apply the right strategy (Mugambwa et al. 2009).

2.1.4. Lethal waste

It alludes to substances, both physical and fluid, which can be harmful to people and the earth. Extraordinary measures and cleaning are executed (Cave, 2010).

2.1.5. Recycling waste

Reusing implies decreasing the measure of flotsam and jetsam being transported. Models incorporate reprocessing and reusability of substances that can be separated (Cave, 2010).

2.2. Hazardous waste transfer

Squander requiring exceptional treatment, other than remaining waste, to avoid natural contamination; These incorporate asbestos, creature corpses, mechanical waste and radioactive materials (Cave, 2010).

Figure 2.1.

Solid Waste Disposal Practices in Remote First Nations Communities



Source: Brandelli, Sala and Kalil, (2015).

2.3. Solid waste management in first nations and communities

Harvesting and waste disposal is a concern for societies, events, businesses and health. With an increase in population level of measles is rapidly rising, thereby making the way for new waste companies, which are producing more than junkyard (Suttibak et. Al., 2008). It is important to monitor the prevention of waste in order to minimize the impacts of environmental waste and human protection (Salha et. al, 2006).

The ratio of waste differs as indicated by the improvement of the trade of each country (Statistics Canada, 2005). Developing countries cause more damage to the company as few books, tools, plasma and synthetics, while countries in the developing world are. Particularly managed by the country is the integration of private waste management schemes that can assure and manage money to strong dams. The widespread differences in developed countries, due to lack of control of the commodity products, recently, there are such practical restrictions designed to solve waste management issues that have begun to increase in the administration of MSW, reduction, repair and rehabilitation in important areas (Al-Khabit et. al, 2007).

Non-compliance, maintenance or repair and rehabilitation of the material are the effects of a pandemic to the health and well-being of the world, even because they are all affected by soil, wind and contamination (Al- Khatib et al., 2007). The United Nations Human Rights Program- [UNHABITAT] (2010) states that rapid changes in erymia, longlife and poor health in urban areas are caused by misuse and lack of sanitation facilities. Additionally, unnecessary ways of managing waste causes unsafe areas. Municipalities deprived of glazing systems experience problems during rainfall which leads to diarrhea and causes disorders such as deformity and weakness (Dauda et al., 2019).

Unsuitable waste often also affects the environment when it turns to water flowing into streams, lakes, and fibers. The dermium bifurcations are covered for low temperatures and the surface of the body is constantly visible. There are even flies and rats in many cities of the country. developing language, landing, and sanitation skills, and individuals who have to pay for survival in conflicts. contributing to wind attacks, tricks are the largest sources of humanity (EU U.S. EPA, 2009).

2.4. Management of solid waste

Metropolitan Waste Management (MSWM) is the act of outlining, organizing, and creating a structure of managing, monetary and statutory component parts of matters related to generation, warehousing, gathering, transportation, processing and disposal, adopting economic, aesthetic, energy and conservation principles. The World Bank Organization (1996) determined that the primary objective of MSWM was to retrieve, treat and try to get rid of hazardous waste emitted by all city groups in an ecologically and societally absolutely free fashion in an easy and affordable means available McDougall and Hruska (2000) indicated that MSWM's objectives have evolved from the main healthcare of the public in regards to human safety, source conservation and the decrease of the eco-friendly onus sewage treatment (greenhouse gas emissions, and loss of basic amenities) as much as possible (Jha et. al., 2011).

Yousuf (2014) posits the three key areas of sustainability being applied to solid waste management as being the:

- Ecologically friendly solutions to our sewage treatment are needed
- Immediate quantitative analysis of possible scenarios and innovations that suggest significant cost savings from the existing sewage treatment system is economically viable.
- Solutions socially acceptable

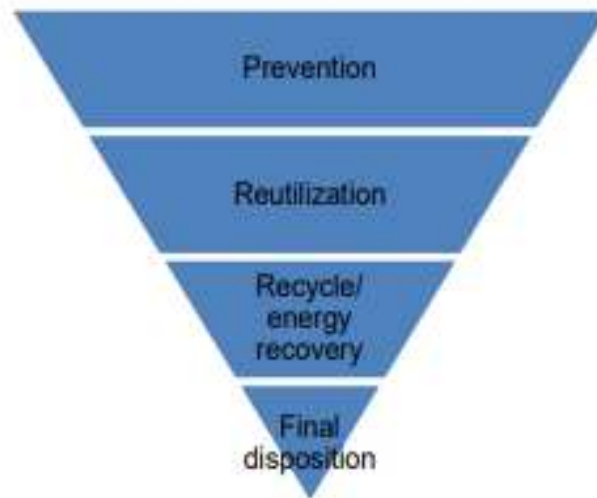
Figure 2.2.

Pillars of sustainability

Source: Yousuf (2014).

The progressive sewage treatment system sets down guidelines and instructions for decreasing waste production and invigorating sewage-recovery, wherein waste antagonistic action, amelioration, recycle, repurpose and recovery of energy is purposed to limit the evaluation of debris that remained thereby having an eco-friendly cities, societies.

Figure 2.3.

Waste management hierarchy

Source: Rosell (2011).

2.5. The concept of integrated solid waste management

Efficiency is significant in the management of waste, the concept of integrating the process of controlling and managing wastes comes to play as it encompasses all areas and sources of covering, generation, separation, sorting, treatment, recovery and disposal. This process maximizes resources effectively and efficiently.

Integrated solid waste administration (ISWM) in the light of the 3R approach is gone for enhancing the administration of strong waste from all the waste-producing divisions (civil, development and pulverization, mechanical, urban agribusiness, and medicinal services offices) and including every one of the partners (squander generators, specialist co-ops, controllers, government, and network/neighborhoods).

Initially SWM focused primarily on mitigating and reducing the dangers to healthy living, however, this became an integral part. Recently, another yardstick of the SWM is resource conservation and resource recovery. The very recent 3R approach is transiting into a controlling element for SWM. From a perspective, the 3R hinders the evaluation of waste from initial phase to transit, doing this actually addresses the issue of

waste more feasibly and in turn significantly reducing the health dangers of the public and the environment. More so, assets recovery is magnified at all aspects of SWM. In recent times, the new idea of ISWM has become familiar with narrowing every phase involved in the administration of waste, in other words, source division, separating and movement, transfer stations and material recovery, processing and assets recovery and last transfer. Primarily it focused on the state of solid waste administration (MSWM). However, the United Nations Environment Program (UNEP) is elevating the idea to cover all waste producing areas to streamline the level of material and asset recuperation that is for reusing and in addition to enhance the productivity of waste administrations. Coordinated strong waste administration framework in view of 3R approach could be ideally composed and executed at a town/city level because of the fundamental part of neighborhood government to give squander accumulation and administrations. In any case, the local/common and national governments need to assume imperative part, particularly to enact fitting approaches and directions and additionally to reinforce the foundations to make empowering condition for ISWM (Are et al., 2017).

2.6. Management options for solid wastes.

Climate change is a major problem in the world today, and apart from the solid waste problem, the main cause of the problem is the increase in human activity, mainly due to the increasing emissions of greenhouse gases (GHG) such as carbon dioxide and methane emission. An important basis for emissions resulting in carbon dioxide concentrations in the environment is due to waste treatment, obviously environmental pollution. Sewage wastes have a negative impact on change and the general well-being of the public. The benefits of promoting public health and environmental friendly soils are substantial, where waste is not fully exploited (Albanna, 2011).

Waste can be divided into four areas: industrial waste, agricultural waste, factory waste, toxic waste. The economic development that has promoted industrialization in many parts of the world over the past few decades increases the amount of municipal waste. Improper disposal and disorderly speculation of various types of waste have had long-term adverse effects on the environment, increased health problems, and adverse impacts on natural resources. Several solid waste management

options have recently been revived, including the collection, treatment, recycling and disposal of solid waste in a way that reduces harmful effects. This chapter thoroughly evaluates many of the most powerful and cost-effective management alternatives, such as dumping, coating, combustion, recycling and gas fuels (LFG) as renewable energy sources. This chapter will also address to the impact of these management strategies on the environment, economy, and human health (Albanna, 2011).

2.6.1. Waste diversion and reduction

Waste redirection or landfill diversion is the way toward diversion of waste from landfills. The accomplishment of landfill diversion can be estimated by correlation of the extent of the landfill starting with year to year then onto the next years. In the event that the landfill develops insignificantly or continues as before, at that point approaches covering landfill diversion are fruitful. For instance, right now in the United States there are 3000 landfills. A measure of the achievement of landfill redirection would be possible if that number continues as before or is diminished. In 2009, it was recorded that the national normal of landfill redirection in the United States was 33.8%, while San Francisco had actualized the best strategies and had recorded a landfill preoccupation rate of 77%. By redirecting landfills we can safeguard our characteristic assets. Henceforth waste diversion is the way toward diversion waste from landfills through recycling and source decrease exercises (Wastes | Browse EPA Topics | US EPA 2012).

2.6.2 Source reduction

This is the total removal of waste before its produced It is also called “contamination prevention”. It includes decreasing the quantity and the toxicity of what is not needful, it refers to the purchasing, and manufacturing materials. By implication it involves the process of particularly stopping waste before it happens. This process helps create an enabling environment (Department of the Earth, 2013).

2.6.3. Recycling

This is the process of transforming already used materials into useful products. This reduces the rate at which raw materials is used that would have used up in the production of a new material. Recycling of waste also uses less energy and it fosters a way of controlling air, water and land pollution

Appropriate recycling of waste starts at home (or where the waste is generated). In many developed countries, government parastatals support residents with garbage bags labeled for them. Residents sort their garbage by themselves and put it in the correct envelope for collection. This makes things easier (ESchoolToday 2017). Just as the waste is changed to new materials and items, the recycling process is another option for "traditional" waste disposal, which conserves material and reduces emissions of ozone-depleting substances (greenhouse gases). Recycling can prevent the waste of potentially useful materials such as energy use, air pollution (incineration) and water pollution (Lienig et. al., 2017) and reduce the use of new raw materials.

2.6.4. Composting and anaerobic digestion

Fertilizing the soil and anaerobic assimilation has been known and utilized since the start of life. It is just the same old thing new in light of the fact that many proofs have appeared even Greeks and Romans utilized it to treat and develop their yields. In this day and age, with the ascent of a dangerous atmospheric devastation, reusing and sustainable power source, fertilizing the soil and anaerobic processing is winding up progressively imperative.

2.6.4.1. Similarities and differences

Ordinary treatment of soil is an oxygen consuming procedure. Under the layers of waste, living beings are normally oxidizing the organic matter, nitrogen synthetic compounds swinging to nitrate, sulfur to sulfate and phosphorus to phosphate. On account of this procedure, the manure abandons a heap of rubbish into supplement rich compost. The main negative side is the point at which the oxygen likewise discharges carbon dioxide. Aside from that, this is incredibly ecofriendly as it is a perfect wellspring of reusing.

Anaerobic assimilation, then again, does not utilize oxygen. Rather, the materials are closed to the bacterial benefiting from the natural issue itself. This framework is extremely moderate when contrasted with the ordinary fertilizing of soil, yet the outcome is undeniably helpful. As the materials anaerobically rot it produces methane, which is a key segment to biogas generation (Jeswani et al., 2019).

2.6.5. Thermal treatments

Annealing is any sewage processing technology that involves using high heat temperatures to treat waste. It normally works with thermal combustion (oxidation), reducing waste to ash and facilitates energy recovery as electricity and heat.

Combustion (incineration) is the act of burning waste to recover energy. Combustion can be done in a furnace at high temperatures (European Directive 850°C for at least 2 seconds). Hence, the energy in waste will be readily converted to heat (hot gases). Gases pass to a boiler (option integrated furnace-boiler). Heat transferred into hot water to produce superheated steam. Steam generates electricity via a turbine. Heat is recovered in CHP (Combined Heat and Power) mode (Are et al., 2017).

2.6.6. Landfill

Land dumping is the most noteworthy management technique for municipal sewage wastes. The garbage can be safely stored in a selected, planned, constructed and operated garbage landfill to ensure a natural and generic welfare. The most prominent of the most important components used to recognize the proper landfill framework is that the wastes acquired never cooperate with surface or ground water. The need for an architectural plan includes a basic distinction between the landfill floor and the high groundwater table for a while. Most new landfills should have an impermeable liner or deterrent on the floor and likewise have a groundwater network plan. Completed landfill fragments should end up with an impermeable spread to prevent precipitation or surface overflow from the security waste. Bass and top liners can be made from a versatile plastic film, a muddy soil layer, or a mixture of the two (Heng, 2017) .

2.7. Solid waste management legislation in Canada

The Canadian association has characterized squanders by and large as "any material, non-perilous or risky, that has no further use, and which is overseen at reusing, preparing, or transfer destinations."

In Canada, the elected, common/regional and metropolitan governments have unmistakable dimensions of obligation with respect to administering and lessening waste. The bodies representing to sewage organization is to an incredible degree entangled, so here's a short review of the present structure, close by a couple of benefits.

The Ontario Ministry of the Environment is accountable for the support, allowing and seeing of waste organization exercises. What this means is that everything considered, for example, our Halton Waste Management Site has Certificates of Approval for the undertaking of the landfill, the nuclear family risky waste station, and the compost pad.

Three normal Acts also relate to squander the board in Ontario:

- Environmental Protection Act (EPA) endorses the Ministry of the Environment to develop commitment on the social event who fail to take all reasonable consideration to keep the entry of pollutions into the earth.
- Environmental Assessment Act (EAA) requires an environmental examination of any genuine open part endeavored that has the potential for critical natural effects, for instance, Halton's landfill.
- Waste Diversion Act (WDA) orders the progression, utilization and the undertaking of waste distraction programs — to decrease, reuse waste. This Legislation makes sense of what and how we reuse, and fundamentally influences an impressive part of the waste distraction programs in Halton Region.

Inside each Act are specific headings that identify waste organization. These headings order how all waste generators (anyone in wherever that is making waste) in Ontario are to manage their waste. Here are just two or three the key Ontario Regulations (O. Reg.) that may impact your family or workplace (Nicole Meek 2012).

Waste dealing with:

(a) Storage: The capacity of strong wastes anyplace with the exclusion of on-site needs consent from the commonplace controller.

(b) Transport: The movement of waste is basically controlled by the areas. In certain areas, for example, Ontario, squander transportation is the subject of allowing. In different regions, for example, Quebec, it isn't. The administration deals with the interprovincial and overall transport of perilous waste. Worldwide improvements are at risk to the essentials of the Basel Convention or the Agreement between the Government of Canada and the Government of the United States concerning as far as possible Movement of Hazardous Waste, which require pre-cautioning and support by the start and tolerating countries as indicated by the Export and Import of Hazardous Waste and Hazardous Recyclable Materials Regulations.

(c) Disposal: Waste exchange is essentially overseen by the regions through permitting of individual regions, but a couple of areas have got landfill benchmarks by bearing. Waste exchange licenses are commonly subject to intensive and sweeping terms and conditions.

(d) Recycling/reuse: Most Canadian districts request some kind of waste distraction through establishment and have grasped squander stewardship necessities that constrain costs on the creators of things. Most areas have specific stewardship necessities for buyer recyclables (eg, paper, glass or plastics), used tires, e-waste, used oil and phenomenal wastes. These ventures are generally assigned to producers or industry groups that address creators of comparable materials, regardless of the way that necessity remains the typical controllers' commitment (Dauda et al., 2019).

2.8. Waste management and human behavior

In previous years, ecological issues have been an imperative from of atmospheric changes to environmental change because of the natural impact. Contamination of air and water are a portion of the principle natural issues that must be considered important. It is noteworthy, that it was discovered that individuals that have anxiety condition of the environment are more likely to show better care, performance and attitude towards waste management. State of mind can be a mental feeling whether the conduct is sure or

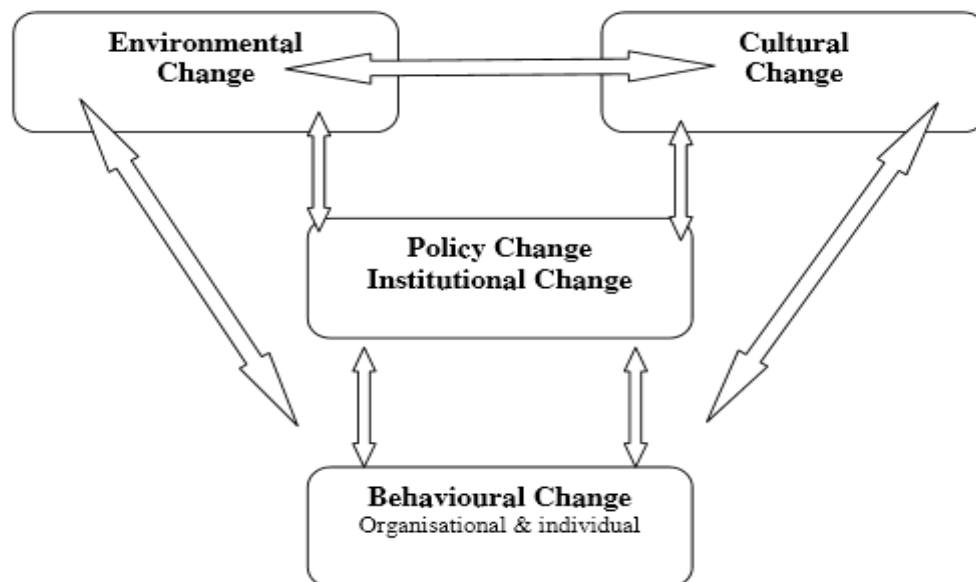
contrary. In addition, an individual will play out a reliable conduct in the event that he or she has an uplifting disposition toward ecological matters. Relations, neighboring families or partners could have impact on the positive ecological practices, for example, treating the soil, recycling and protection. Further, showing worthy social conduct or regularizing impacts can bring about a change in attitude or conduct of a person and people around (Are et al., 2017).

Natural concerns have appeared to be surpassed with other conflicting components, for example sluggishness or nonattendance of enthusiasm for guaranteeing earth amicable encompassing Blake (1999). The exercises of neighbors can solidly affect reusing conduct in the midst of inhabitants and activities (Shaw, 2008), perspectives likewise motivation of reusing is centered around uneven towards individuals rather than the whole networks (Lyas et al., 2005)

In addition, an overview uncovered that the majority of family units utilize local authority, as opposed to private waste collection administrations (both are accessible). The larger part of inhabitants, paying little respect to the neighborhood expert in which they live, were happy with their waste administration benefit. "Lessening the amount of waste created" was respected the most important future issue for 28% of private respondents. Measurable investigations of the overview reactions demonstrated that the neighborhood specialist in which respondents dwelled essentially impacted most reactions (counting waste gathering administration utilized, waste benefit fulfillment and patio fertilizing the soil action). Numerous reactions (counting waste administration fulfillment, waste administration impacts) were likewise essentially identified with the respondents' personal characteristics (e.g., training level, sort of convenience, age, and so on.). These measurable outcomes demonstrated the theory of the examination and showed that waste administration activities intended for one region of the city (or, in fact, for uniform application to the city as a whole) could disregard the requirements of different territories. The overview reactions propose that focused intervention techniques would prompt enhanced diversion rates of wastes from landfill, a requirement of the Landfill Directive 1999/31/EC (Purcell and Magette 2010).

Figure 2.4.

Streamlined pattern of influences on actions in waste disposal



Source: Ekins, (2004).

2.9. Hazardous wastes

2.9.1. Definition of hazardous wastes

Hazardous material is characterized as waste or waste combinations that can cause significant effect to or prospective hazard to habitat able place where humans lives and other living organisms, because of the following reasons:

1. These wastes are inherently non - degradable or persistent,
2. They can be amplified biologically,
3. They can be fatal / deadly, or they can otherwise probably cause or usually cause poisonous and adverse effects that can lead to individual death (Are et al., 2017).

Hazardous waste treatment and management should focus on understanding the waste generated by the organization. Hazardous waste is intensely overseen, so it cannot be treated in a way that is treated as waste every day. To be sure that you are handling hazardous wastes, you should initially assess the properties.

When classifying hazardous waste, EPA divides them into four characteristics:

- Flammable or flammable (inflammable) Hazardous wastes associated with the flammability characteristic include fluids with a flash point below 60 ° C, illiquid liquids that cause a fire under certain conditions, flammable compressed gases and oxidizers.

- Corrosive or something that may rust or decompose: Hazardous waste characteristics, due to the corrosivity characteristics, include water wastes with a pH less than or equal to 2, a pH greater than or equal to 12.5, or based on the ability of liquids to corrode steel. The Environmental Protection Agency has designated D002 as the waste code for hazardous waste.

- Reactive or explosive: waste that is hazardous due to its reactivity characteristics may be unstable under normal conditions, may react with water, may release toxic gases and may be able to explode or explode under normal conditions or when heated. The EPA assigned D003 as a waste code for reactive hazardous waste.

- Toxic or poisonous: waste that is hazardous due to toxicity is harmful if ingested or absorbed. Toxic waste is a problem because it can leach out of waste and pollute groundwater (Hazardous Waste Experts 2014).

CHAPTER III

RESEARCH METHOD

The aim of this chapter is to describe in descriptive terms the methodology approved. The supposition indicated in the previous part of this study is to be tested. This chapter consists of the particular research design consisting of data collection mode, hypothesis development, theoretical framework and the different data analysis introduced for this research.

3.1. Research model

This study mainly focused on this write up is to assess factors challenging public environmental awareness on implication of improper poultry waste disposal in Tripoli, Libya. This study is based on field study carried out in Tripoli, Libya on the 18th and the 19 July 2018. The method applied in this study to make it more reliable is quantitative method through questionnaires and from sources like articles, textbooks, and studies on the subject and internet source.

3.2. Data collection

The data were collected through questionnaires on the 18th and the 19th July 2018 from submission near Tripoli. Totally three hundred fifty questionnaires were administered to 350 farmers. The previews are a one-to-one method of appropriation of feeling in order to effectively solve the problems that can be provided by the answers in their efforts to care for the choice. The study has four sections with a combination of 35 questions. It was really interesting because the farmers cooperated and participated fully for the period of two weeks that the interview was scheduled. The technique supported that empirical information collated from few targeted farmers can as well be used to generalize the opinions of non-participant farmers (Lindner et al., 2001).

3.3. Data analysis

Both the referential and descriptive data analysis was carried out through the application of SPSS 20 software which was marked at critical upper value of 0.05. All

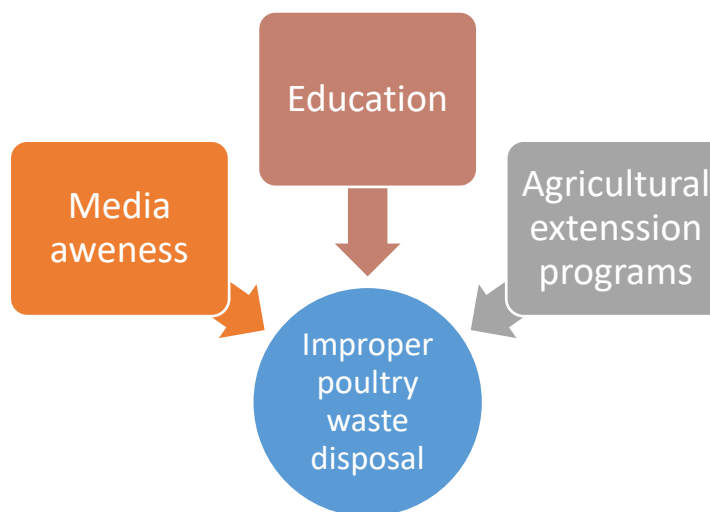
these were revealed by frequency test pair -wise differences evaluation of environmental awareness on implication of improper poultry waste disposal in Tripoli, Libya.

3.4. Structure of information analysis

The focus of the research is to summarize the problems that provide attention to poultry ranchers in a neighboring natural environment because **an AI-recommended removal of waste into the ground.**

Figure 3.1.

Theoretical frame work of the study



3.5. Validity and reliability

The estimation technique used is Cronbach alpha and it delineates the closeness of the scale. In by and large, a consistency coefficient of 0.70 and additionally overhead is the most reasonable. The examinations the figured Cronbach Alpha is as in table 3.1 with an estimation of 0.986. Henceforth, we unequivocally express that the scales are dependable for the examination.

Table 3.1.

Reliability Measurements

| Cronbach's Alpha | N of Items |
|------------------|------------|
| .986 | 35 |

3.6. Ethical aspect of the research

All the ethical rules and regulations were duly observed and complied with. The information collected regarding the respondents were kept confidential and undisclosed for any public identification and the data collected were specifically used for the purpose of this research which was basically for academic reasons.

CHAPTER IV

RESULTS AND DISCUSSION

This section comprises of data analysis results sourced with the questionnaire using statistical package for social analysis. The results represent the frequency distribution of the participants' responses to the distributed questionnaires. Results are presented in tables and figures.

4.1. Demographic back ground of respondents

Table 4.1.

Marital status frequency distribution of Respondents

| Marital Status | Frequency | Percent |
|-----------------------|------------------|----------------|
| Single | 214 | 61.1 |
| Married | 78 | 22.3 |
| Divorced | 29 | 8.3 |
| Widowed | 29 | 8.3 |
| Total | 350 | 100.0 |

Table 4.1 reveals that the population based on marital status has the single population with the highest frequency of 214 out of 350 and a valid percentage of 61.1%. The lowest population included divorced and widowed people with a frequency of 29 and a percentage of 8.3%.

Table 4.2. Age frequency distribution of respondents

| Age | Frequency | Percent |
|--------------|------------------|----------------|
| 18-25 | 158 | 45.1 |
| 26-30 | 78 | 22.3 |
| 31-35 | 64 | 18.3 |
| 35> | 50 | 14.3 |
| Total | 350 | 100.0 |

Table 4.2 shows that amongst the total population (350) depicted in table 1 the

population with the highest frequency is between the ages of 18-25 and the least population is 35 and over.

Table 4.3.

Gender frequency distribution of respondents

| Gender | Frequency | Percent |
|---------------|------------------|----------------|
| Male | 208 | 59.4 |
| Female | 142 | 40.6 |
| Total | 350 | 100.0 |

Table 4.4 shows that amongst the total frequency, the gender percentage allocated 59.4% to male and 40.6% to females, showing a higher number of male than female with a frequency of 208 to 142, an indication that poultry farming needs more energy and man-power.

Table 4.4.

Frequency distribution for Number of years in poultry farming

| Years | Frequency | Percent |
|--------------|------------------|----------------|
| > 5years | 145 | 41.4 |
| 5-10years | 85 | 24.3 |
| 10years > | 120 | 34.3 |
| Total | 350 | 100.0 |

From the total population depicted in table 4.1, table 4.4 shows the number of years the people have spent working on farms with the highest frequency of 145 less than 5 years with a percentage of 41.4% and the least years to be 5 to 10 years with a frequency of 85 and a valid percentage of 24.3%.

Table 4.5.

Frequency distribution of the purpose for poultry farming

| | Frequency | Percent |
|--|------------------|----------------|
| Commercial purpose | 128 | 36.6 |
| House hold consumption | 144 | 41.1 |
| For both household consumption and commercial purposes | 78 | 22.3 |
| Total | 350 | 100.0 |

Table 4.5 shows that from the total population of 350; 144 people went with the choice of poultry for the use of household consumption which had the highest percentage of 41.1%, followed by commercial purpose with a frequency of 128 and a percentage of 36.6% and the least frequency of 78 for both household consumption and commercial purposes with a percentage of 22.3%. Most people go into poultry farming for household consumption.

Table 4.6.

Frequency distribution of formal education level

| | Frequency | Percent |
|-----------------------|------------------|----------------|
| Never been interested | 151 | 43.1 |
| A-level | 99 | 28.3 |
| Diploma | 50 | 14.3 |
| Degree | 50 | 14.3 |
| Total | 350 | 100.0 |

Table 4.6 shows that the formal education level of the population used for the consensus had the highest frequency of 151 who have never been to school and a percentage of 43.1% and the lowest frequency of 50 with a percentage of 14.3%, Diploma and Degree holders.

Table 4.7.

Frequency distribution showing the size of poultry farms

| | Frequency | Percent |
|--------------------|------------------|----------------|
| Less than 2 acres | 74 | 21.1 |
| 2-5 acres | 85 | 24.3 |
| 6-10 acres | 57 | 16.3 |
| More than 10 acres | 134 | 38.3 |
| Total | 350 | 100.0 |

Table 4.7 shows that people owning more than 10 acres of land for poultry farming had the highest frequency and a percentage of 38.3%, followed by 2 to 5 acres with a frequency of 85 and a percentage of 24.3%, less than 2 acres with a frequency of 74 and a valid percentage of 21.1% and the least was people who own poultry farms with 6-10 acres, with a frequency of 57 and a validity percentage of 16.3%.

Table 4.8.

Frequency distribution of quantity of poultry waste generated in a farm per day

| | Frequency | Percent |
|--------------|------------------|----------------|
| 1kg | 102 | 29.1 |
| 5kg | 43 | 12.3 |
| 10kg | 85 | 24.3 |
| 10kg> | 120 | 34.3 |
| Total | 350 | 100.0 |

Based on the information in table 4.7, Table 4.8 shows the amount of poultry waste generated in a farm per day, with more than 10kg of waste having the highest frequency and percentage of 34.3%, followed by 1kg waste per day with a frequency of 102 and a percentage of 29.1% and the least poultry waste generated was 5kg per day with a frequency of 43 and a percentage of 12.3%. These figures were possibly due to the fact that table 7 reported the highest frequency owning more than 10 acres of land.

Table 4.9.

Frequency distribution of storage receptacle for poultry waste in farm

| | Frequency | Percent |
|--------------|------------------|----------------|
| Yes | 93 | 26.6 |
| No | 257 | 73.4 |
| Total | 350 | 100.0 |

For the storage receptacle for poultry waste on farm lands, Table 4.9 shows the highest frequency of 257 and a validity percentage of 73.4% do not have storage receptacle for poultry waste on their farm and the least frequency of 93 with a percentage of 26.6% own storage receptacle for poultry waste on their farm lands.

Table 4.10.

Frequency distribution of composition of waste generated from poultry farms

| | Frequency | Percent |
|------------------|------------------|----------------|
| Plastic | 22 | 6.3 |
| Metal Above 10kg | 29 | 8.3 |
| Wood (Bamboo) | 122 | 34.9 |
| Feathers | 169 | 48.3 |
| Feeds | 8 | 2.3 |
| Total | 350 | 100.0 |

With poultry farming, it is inevitable for different types of waste to be generated Table 4.10 shows that the highest type of waste generated with the highest frequency of 169 were feathers with a percentage of 48.3%, followed by wood (bamboo) with a frequency of 122 and a percentage of 34.9%, metal above 10kg with a frequency of 29 and a percentage of 8.3%, plastic with a frequency of 22 and percentage of 6.3% and the least waste produced were feed with a frequency of 8 and a percentage of 2.3%. The highest waste produced could be understood from the standpoint that it's a poultry farm which includes birds and birds shed their feathers and the lowest percentage could be supported because birds constantly eat their feed.

Table 4.11.

Frequency distribution of problems encountered or faced in poultry waste storage

| | Frequency | Percent |
|---------------------------|------------------|----------------|
| Awful smell | 93 | 26.6 |
| Complaints from neighbors | 257 | 73.4 |
| Total | 350 | 100.0 |

Table 4.11 shows that the main problems encountered in poultry storages include awful smell and complaints from neighbors, with the highest frequency of 257 and valid percentage of 73.4% going to complaints from neighbors, because of the loud sounds birds make and the least frequency of 93 going to awful smell with a percentage of 26.6%.

Table 4.12 Frequency distribution of methods of poultry waste disposal

| | Frequency | Percent |
|--|------------------|----------------|
| Digging a hole around the house/in the village and bury or burn it Wood (Bamboo) | 221 | 63.1 |
| Throwing it on an open space or on the street | 7 | 2.0 |
| Throwing it in to the nearby river Others (Specify | 8 | 2.3 |
| Private collectors take it | 114 | 32.6 |
| Total | 350 | 100.0 |

Table 4.12 shown the ways in which people dispose of their waste, with the highest frequency of 221 digging holes around the house or burning and a percentage of 63.1%, because poultry waste is somewhat biodegradable, followed by private collectors with a frequency of 114 and a percentage of 32.6%. Possibly to use them as manure, throwing it into a nearby river with a frequency of 8 and a percentage of 2.3% and throwing it in an open space or on the street with the lowest frequency of 7 and a valid percentage of 2.0%.

Table 4.13.

Frequency distribution of intervention by government agencies in collecting poultry waste per week.

| | Frequency | Percent |
|-----------------|------------------|----------------|
| Once | 44 | 12.6 |
| Twice | 92 | 26.3 |
| More than Twice | 214 | 61.1 |
| Total | 350 | 100.0 |

To achieve maximum disposal of poultry waste, government agencies should be very functional in their collection activities Table 4.13 shows that the government goes round to collect poultry waste every week with the highest frequency of 214 for more than twice in a week with a percentage of 61.1%, exactly twice a week with a frequency of 92 and a percentage of 26.3% and the least frequency of 44 at exactly once a week with a percentage of 12.6%.

Table 4.14.

Frequency distribution of satisfaction with government services on collection of poultry waste.

| | Frequency | Percent |
|--------------|------------------|----------------|
| Yes | 257 | 73.4 |
| No | 93 | 26.6 |
| Total | 350 | 100.0 |

Obviously, everyone cannot be satisfied with the services the government renders, as its only human not always be satisfied with results whether good or bad. Table 4.14 shows 257 respondents to be satisfied with the services the government renders and this is also the highest frequency with a percentage of 73.4% and the lowest frequency of 93 were people who were dissatisfied with the services of the government with a percentage of 26.6%.

Table 4.15.

Frequency distribution with satisfaction with the existing poultry waste collection practices.

| | Frequency | Percent |
|--------------|------------------|----------------|
| Yes | 247 | 70.6 |
| No | 103 | 29.4 |
| Total | 350 | 100.0 |

Table 4.16 shows that most people were satisfied with the existing poultry waste collection and disposal they were practicing with a frequency of 247 and a percentage of 70.6% and the least frequency of 103 were dissatisfied with the poultry waste collection and disposal they were practicing.

Table 4.16.

Frequency distribution of suggestions on ways to improve poultry waste management

| | Frequency | Percent |
|--|------------------|----------------|
| Practice mixed waste disposal | 166 | 47.4 |
| Use waste for other Agricultural processes | 184 | 52.6 |
| Total | 350 | 100.0 |

Nothing on earth is considered a waste, as long as it can be reused or transformed to another product. Based on the consensus, most people went with the use of waste for other agricultural processes with a percentage of 52.6% to improve poultry waste management.

Table 4.17.

Frequency distribution of perceptions of the importance of waste recycling

| | Frequency | Percent |
|------------------------------------|------------------|----------------|
| Economic purpose | 110 | 31.4 |
| Solve problem of energy generation | 148 | 42.3 |
| Curtail expenditure | 92 | 26.3 |
| Total | 350 | 100.0 |

Table 4.17 clearly shows that a majority of people feel that solving the problem of

energy generation will help proper management of poultry waste.

Table 4.18.

Frequency distribution on farmer's perception of the best institute to handle poultry waste management

| | Frequency | Percent |
|-----------------------|------------------|----------------|
| Government | 129 | 36.9 |
| Municipal Corporation | 163 | 46.6 |
| Private Companies | 58 | 16.6 |
| Total | 350 | 100.0 |

Different parastatals handle waste differently, as in Table 4.18, the majority went with Municipal Corporation for the handling of poultry waste with a frequency of 163 and a percentage of 46.6%.

Table 4.19.

Frequency distribution of farmers' willingness to pay to improve poultry waste management services

| | Frequency | Percent |
|--------------|------------------|----------------|
| Yes | 278 | 79.4 |
| No | 72 | 20.6 |
| Total | 350 | 100.0 |

Because of the smell that poultry waste gives off, the majority of the population went with “yes” to the question of improving poultry management services, implying a possibility of more people taking up poultry farming when some improvement in the management system is achieved.

Table 4.20.

Frequency distribution of preferred ways of getting information regarding poultry waste management by the farmers

| | Frequency | Percent |
|---------------------------------|------------------|----------------|
| Through the media | 36 | 10.3 |
| Through phone | 76 | 21.7 |
| From extension farmers meetings | 238 | 68.0 |
| Total | 350 | 100.0 |

Farmers interact one on one with their animals. As Table 4.20 shows the best/preferred way to get information regarding waste management would be through extension farmers meetings with a percentage of 68.0%.

Table 4.21.

Frequency distribution of the media used y

| | Frequency | Percent |
|--------------|------------------|----------------|
| Radio | 221 | 63.1 |
| Television | 50 | 14.3 |
| Newspaper | 71 | 20.3 |
| Magazine | 8 | 2.3 |
| Total | 350 | 100.0 |

With advancement in technology, the most frequent media used according to the consensus is the radio, with a frequency of 221 and a percentage of 63.1%, followed by newspapers with a frequency of 71 and a percentage of 20.3%, television with a frequency of 50 and a percentage of 14.3% and through magazines with a frequency of 8 and a percentage of 2.3%.

Table 4.22.

Frequency distribution of perceptions of farmers that media have a great role in creating awareness on environmental matter

| | Frequency | Percent |
|---------------|------------------|----------------|
| Very true | 200 | 57.1 |
| True | 106 | 30.3 |
| Somewhat true | 29 | 8.3 |
| Not true | 15 | 4.3 |
| Total | 350 | 100.0 |

Based on the issue of media and awareness, a majority of people with a frequency of 200 strongly agreed that media does have a great role in creating awareness on environmental matters.

Table 4.23.

Frequency distribution level of satisfaction derived from the media on proper solid waste management?

| | Frequency | Percent |
|----------------------|------------------|----------------|
| Completely satisfied | 179 | 51.1 |
| Somewhat satisfied | 50 | 14.3 |
| Don't know | 57 | 16.3 |
| Not satisfied | 64 | 18.3 |
| Total | 350 | 100.0 |

Considering the media's responsibility for informing the general public about issues concerning the environment has been very efficient and effective, 179 participants were completely satisfied with the media on proper solid waste management.

Table 4.24.

Frequency distribution of the answers to the question “Have you had a chance of being educated by environmental educators?”

| | Frequency | Percent |
|--------------|------------------|----------------|
| Yes | 93 | 26.6 |
| No | 257 | 73.4 |
| Total | 350 | 100.0 |

Environmental educators have an important role to play in dispersing information to the general public, but so far, a majority of the population with a frequency of 257 reported that they have not had a chance to be educated by environmental educators with a percentage of 73.4%.

Table 4.25.

Frequency distribution of factors hindering farmers from getting information from environmental educators on poultry waste management

| | Frequency | Percent |
|----------------------------------|------------------|----------------|
| Difficult to locate their office | 100 | 28.6 |
| Have many appointment to make | 50 | 14.3 |
| Doesn't visit my area regularly | 200 | 57.1 |
| Total | 350 | 100.0 |

Considering there is already a lack of environmental educators, there are factors that hinder a smooth passage of information to poultry farmers, but the most frequent factor that hinders this is the irregular visits to the area with a frequency of 200 and a percentage of 57.1%, followed by difficult location of their office with a frequency of 100 and a percentage of 28.6% and the factor that hinders this the least is the many appointments to make with a frequency of 50 and a percentage of 14.3%.

Table 4.26.

Frequency distribution of how useful farmers find the information received from extension officers in overcoming waste management challenges

| | Frequency | Percent |
|-------------------|------------------|----------------|
| Very useful | 263 | 75.1 |
| Moderately useful | 87 | 24.9 |
| Total | 350 | 100.0 |

Even with the lack of environmental educators, the highest percentage of 75.1% said they found the information very useful in overcoming waste management challenges.

Table 4.27.

Frequency distribution of various training programs attended by famers

| | Frequency | Percent |
|------------------------------|------------------|----------------|
| Field/home visit | 71 | 20.3 |
| Waste management orientation | 60 | 17.1 |
| Agro allied conferences | 219 | 62.6 |
| Total | 350 | 100.0 |

Amongst all the environmental education training programs, the one with the most participants has been the Agro allied conferences with a frequency of 219 and a percentage of 62.6%, because it is about agricultural produces, followed by field/home visit with a frequency of 71 and a percentage of 20.3% and the least attended training program participated in as the waste management orientation with a frequency of 60 and a percentage of 17.1%.

Table 4.28.

Frequency distribution

| | Frequency | Percent |
|-------------------|------------------|----------------|
| Strongly agree | 250 | 71.4 |
| Not sure | 51 | 14.6 |
| Strongly disagree | 49 | 14.0 |
| Total | 350 | 100.0 |

The cleanliness of the city is strongly dependent on the general public.

Table 4.29.

Frequency distribution on farmers' perception that solid waste environmental pollution is not real

| | Frequency | Percent |
|-------------------|------------------|----------------|
| Strongly agree | 36 | 10.3 |
| Not sure | 50 | 14.3 |
| Disagree | 57 | 16.3 |
| Strongly disagree | 207 | 59.1 |
| Total | 350 | 100.0 |

Solid waste environmental pollution has left doubts in the minds of people with the least frequency of 36 and a percentage of 10.3%. The majority of the population, 207 (59.1%) believe it is real.

Table 4.30.

Frequency distribution of farmers' perception that maintaining economic growth is more important than protecting the natural environment

| | Frequency | Percent |
|-------------------|------------------|----------------|
| Strongly agree | 91 | 26.0 |
| Disagree | 63 | 18.0 |
| Strongly disagree | 196 | 56.0 |
| Total | 350 | 100.0 |

Maintaining economic growth and protecting the natural environment are both very important, but of course, some people believe one is more important than the other. Based on the consensus taken, most people with a frequency of 196 and a percentage of 56.0% strongly disagreed at maintaining economic growth being more important than protecting the natural environment. In another context, it could imply that protecting the natural environment is more important than maintaining economic growth.

Table 4.31.

Frequency distribution of farmers' perception that if poultry waste is not properly managed, we will soon experience a major ecological catastrophe

| | Frequency | Percent |
|----------------|------------------|----------------|
| Strongly agree | 329 | 94.0 |
| Not sure | 21 | 6.0 |
| Total | 350 | 100.0 |

Major ecological catastrophes wait befalling the earth if poultry wastes are not properly managed. If problems like release of toxic gases to the atmosphere, thereon reaching the stratosphere and causing further damage to the ozone layer.

Table 4.32.

Frequency distribution 'I am very well informed about poultry waste management?'

| | Frequency | Percent |
|-------------------|------------------|----------------|
| Strongly agree | 238 | 68.0 |
| Not sure | 56 | 16.0 |
| Disagree | 21 | 6.0 |
| Strongly disagree | 35 | 10.0 |
| Total | 350 | 100.0 |

238 people say they are well informed about poultry waste management and needs to be done to sensitize people about the use of poultry waste management.

Table 4.33.

Frequency distribution of 'Has there been any solid waste management program organized by the government for poultry farmers in your area?'

| | Frequency | Percent |
|--------------|------------------|----------------|
| Yes | 108 | 30.9 |
| No | 242 | 69.1 |
| Total | 350 | 100.0 |

For the majority of the respondents, 242 (%69.1), so far, the government has not organized solid waste management programs for poultry farmers in the area.

Table 4.34.

Frequency distribution "If the answers to question 21 above are "yes", how often is the program held?"

| | Frequency | Percent |
|-----------------|------------------|----------------|
| Once on a month | 24 | 6.9 |
| Once in a year | 326 | 93.1 |
| Total | 350 | 100.0 |

Because these programs are expensive, the government mainly organizes these programs once a year.

Table 4.35.

Who are the responsible parties for solid waste environmental pollution?

| | Frequency | Percent |
|--------------|------------------|----------------|
| Citizens | 107 | 30.6 |
| Government | 243 | 69.4 |
| Total | 350 | 100.0 |

Everyone should be aware of solid waste environmental pollution, so as to know what to do with the waste and possibly how to treat them, but so far the government has had the highest frequency of 243 for being responsible for awareness programs with a percentage of 69.4% and the citizens responsible for the remaining 30.6%.

Table 4.36.

Frequency distribution of rating of famers on government efforts in creating awareness

| | Frequency | Percent |
|--------------|------------------|----------------|
| Good | 42 | 12.0 |
| Fair | 123 | 35.1 |
| Bad | 185 | 52.9 |
| Total | 350 | 100.0 |

The government is trying, but the populace does not believe they are doing enough, with only 42 people who agree that their effort is good with a percentage of 12%. 123 people say the government is doing a fair job with a percentage of 35.1% and

185 people say the government's effort is bad with a percentage of 52.9%.

Table 4.37

Frequency distribution of farmer's perception that government extension programs will help educate theme on proper waste management.

| | Frequency | Percent |
|---------------|------------------|----------------|
| Very true | 171 | 48.9 |
| True | 88 | 25.1 |
| Somewhat true | 63 | 18.0 |
| Not true | 28 | 8.0 |
| Total | 350 | 100.0 |

Because of the inadequacy of the government awareness programs, the government extension programs will help educate people on proper waste management, 171 people strongly agreed with a percentage of 48.9%, 88 people found this to be true with a percentage of 25.1%, 63 people found this idea to be somewhat true with a percentage of 18.0%, but 28 people found this to be false with a percentage of 8%, which can be seen to be negligible.

CHAPTER V

CONCLUSION AND RECOMMENDATIONS

5.1. Conclusions

Municipal solid waste management is vital in urban settlement planning. Natural pollution is a standout amongst the most critical issues facing mankind today. Poultry farming has been tremendously successful over the past years, however, little care is attributed to the management of the waste generated from such farms and their possible dangers on the environment if not properly managed.

This study aimed at assessing the various challenges confronting the public regarding improper disposal of poultry waste. Quantitative data analysis through the use of questionnaires was adopted for this study. The questionnaires were distributed to farmers within the Libyan province. From the findings of the study, it was discovered that over 10 kg of waste is generated in most of the poultry farms in Libya per day. However over 73.4% do not have storage receptacle for poultry waste on their farm. This shows that the main problems encountered with poultry storages include bad smell and complaints from neighbors.

Based on the issue of media and awareness, a majority of people with a frequency of 200 strongly agree that media does have a great role in creating awareness of environmental matters. In addition, a majority of the population with a frequency of 257 reported that they have not had a chance to receive any education by environmental educators with a percentage of 73.4%. This findings is trouble as it reveals that farmers in Libya are less informed on the proper ways to manage the poultry waste generated on their farms. Hence, this study generalizes that media and government agencies in Libya have failed in creating awareness of proper poultry waste management and hence it is the major factor contributing to the improper management of poultry and other solid waste in Libya.

5.2 Recommendations

The following recommendations were therefore generated during the course of this study;

Major ecological catastrophes wait befalling the earth if poultry wastes are not properly managed. Problems like release of toxic gases to the atmosphere, thereon reaching the stratosphere cause further damage to the ozone layer. This study recommends more insight on the and very role of governments both in Libya and other developing countries how to curtail the environmental menace of poultry waste.

- The government should also increase funding into agricultural sector so as to acquire agricultural inputs
- It is vital for farmers to get some level of high education as this will contribute a lot to their management techniques for poultry waste disposal.
- The government has a very vital role to play with regards to educating farmers on environmental health and sustainability as well as proper means of waste disposal. This can be achieved through government agricultural extension services.
- There are lots of researches to be conducted on proper management of poultry waste and the various factors that determine the impact of generated poultry waste on the ecosystem. Also studies on the ways to improve government intervention with sole aim of educating poultry farmers ought to be conducted.
- The government should look into the tenure right of land ownership so as to encourage young and vibrant poultry farmers

REFERENCES

- Akanni K. A. & Benson O. B. (2014). Poultry wastes management strategies and environmental implications on human health in Ogun State of Nigeria. *Journal of Advances in Economics and Business* 2(4), 164-171.
- Albanna, M. (2011). Solid Waste Management Options and their Impacts on Climate Change and Human Health. *Journal of Environmental Protection Strategies for Sustainable Development*, 9(3), 499-528.
- Al-Khatib, I., Arafat, H., Basheer, T., Shadwahneh, H., Salahat, A., Eid, J. & Ali, W. (2007). Trends and problems of solid waste management in developing countries: A case study in seven Palestinian districts. *Journal of Waste Management*, 27, 1910-1919.
- Almagoari B. A. S. (2013). Industries revolving prospects for investment and protection of the environment, Benghazi, Libya.
- Alshriane A. & Bin. A (2003). Waste management legislation in the countries of the Cooperation Council for the Arab States of the Gulf Benghazi, Libya.
- Are, K., Adelana, A., Fademi, I. and Aina, O. (2017). Improving physical properties of degraded soil: Potential of poultry manure and biochar. *Agriculture and Natural Resources*, 51(6), pp.454-462.
- Blake, J. (1999). Overcoming the 'value-action gap' in environmental policy: Tensions between national policy and local experience. *Journal of Local Environment*, 4(3), 257-278.
- Boggia A., Polotti L. & Castellini, C. (2010): Environmental impact evaluation of conventional, organic and organic-plus poultry production systems using life cycle assessment. *World's Poultry Science Journal*, 66(1), 95-114.
- Brandelli, A., Sala, L. and Kalil, S. (2015). Microbial enzymes for bioconversion of poultry waste into added-value products. *Food Research International*, 73, 3-12.

- Cave, K. (2010). First Nation Waste Management Initiative Tools and Human Capacity Building Needs Assessment Survey. FNWMI/Tools and Human Capacity Building Needs Assessment Survey, Centre for Indigenous Environmental Resources Inc.
- Cointreau-Levine, S. & Coad, A. (2000). *Guidance pack: Private sector participation in municipal solid waste management*. St.Gallen, SKAT: Swiss Centre for Development Cooperation in Technology and Management.
- DaSilva, M. C., Fassa, A.G., Siqueira, C. E. & Kriebel, D. (2005). World at work: Brazilian rag pickers. *International Journal of Occupational & Environmental Medicine*, 62(10), 736-740.
- Dauda, A., Ajadi, A., Tola-Fabunmi, A. and Akinwole, A. (2019). Waste production in aquaculture: Sources, components and managements in different culture systems. *Aquaculture and Fisheries*, 4(3), pp.81-88.
- Department of the Environment (2013). Source Reduction. Available at: http://mde.maryland.gov/programs/LAND/RecyclingandOperationsprogram/Pages/source_reduction.aspx. Accessed on 5th july 2018.
- Ekins, P. (2004). Answers to the core programme questions on environment and human behaviour, *Environment and Human Behaviour Newsletter 02*, Policy Studies Institute, London.
- Environment Protection Agency EPA (2009). Wastes-Resource conservation-conservation tools. Pay as you throw. Retrieved July 20 2012. <http://www.epa.gov/epawaste/conservetools/pay/research.htm>.
- ESchool Today (2017). Your cool facts and tips on waste management. Available at: <https://www.eschooltoday.com/waste-recycling/what-is-recycling.html>. Accessed on 28th july 2018.
- Guèye E. F. (2014). Libya's poultry industry on its way to large-scale privatization. *World Poultry*, 20(12).

- Gundersen, P. (1992). Mass balance approaches for establishing critical loads for nitrogen in terrestrial ecosystems. In Proceedings of a Workshop in Lockenberg. *Copenhagen, Nordic Council of Ministers Report, 56* (81).
- Hazardous Waste Experts (2014). Understanding the Four Characteristics of Hazardous Waste. Available at: <https://www.hazardouswasteexperts.com/understanding-the-four-characteristics-of-hazardous-waste/>. Accessed on 1st august 2018.
- Heng, D. (2017). Bio gas plant green energy from poultry wastes in Singapore. *Energy Procedia*, 143, pp.436-441.
- Hertzman, C. (1991). Confronting health issues in solid waste management. In Haight, M (Ed). *Municipal solid waste management, making decisions in the face of uncertainty*, 43-52. Institute for Risk Research. Waterloo, ON: University of Waterloo Press.
- Jekria, N. & Daud, S. (2016). Environmental concern and recycling behaviour. *Procedia Economics and Finance* 35(12) 667-673.
- Jeswani, H., Whiting, A., Martin, A. and Azapagic, A. (2019). Environmental impacts of poultry litter gasification for power generation. *Energy Procedia*, 161, pp.32-37.
- Jha, A. K., Singh, S. K., Singh, G. P., & Gupta, P. K. (2011). Sustainable municipal solid waste management in low income group of cities: A review. *International Journal of Tropical Ecology*, 52(1), 123-121.
- Kopeć, M., Gondek, K., Mierzwa-Hersztek, M. and Antonkiewicz, J. (2018). Factors influencing chemical quality of composted poultry waste. *Saudi Journal of Biological Sciences*, 25(8), 1678-1686.
- Lienig, J. & Bruemmer H. (2017). Recycling Requirements and Design for Environmental Compliance". *Fundamentals of Electronic Systems Design*. Springer, 197. Available at: <https://en.wikipedia.org/wiki/Recycling>. Accessed on 11th july 2018.

- Lyas, J. K., Shaw, P. J. & Vugt, V. M. (2005). Kerbside recycling in the London Borough of Havering: progress and priorities. *Journal of Resources, Conservation and Recycling*, 45(1), 1-17.
- Maheshwari, Shashank. (2013). Environmental Impacts of Poultry Production. *International Journal of Poultry fisheries & Wildlife sciences*. 1.10.4172/pfw.1000101.
- McDougall, F. R. & Hruska, J. P. (2000). The use of life cycle inventory tools to support an integrated approach to solid waste management. *Journal of Waste Management and Research*, 18(6), 590-594.
- Meek, N. (2012). The rules and regulation governing wastes in Canada. Halton Recycles. Available at:<https://haltonrecycles.wordpress.com/2012/06/13/waste-management-legislation-in-a-nutshell/>. Accessed on 10th July 2018.
- Mukisa Philemon Kirunda. (2009). *Public Participation in solid waste management: Challenges and prospects*. Uganda: Kira Town Council Publishing.
- Nahm, K.H. & Nahm, B.A. (2004). Poultry production and waste management. Poultry Science Association. Research demonstrates effectiveness of trees and shrubs in reducing odors, dust and ammonia from poultry farms.
- National Planning Council (2009). Study the possibility of investment of solid waste in order to achieve environmental and economic returns, both in partnership with companies national or non-national in Benghazi city.
- Omran A. G. A. (2013). Solid waste pollution and the importance of environmental planning in managing and preserving the public environment in Benghazi city and its surrounding areas. *International Journal of Environmental, Chemical, Ecological, Geological and Geophysical Engineering*, 7(12).
- Omran, Abdelnaser, Gebiril, Abdelsalam & Hamid Kadir Pakir, Abdul & Aziz, Hamidi Abdul. (2010). Municipal solid waste management in Benghazi (LIBYA): Current practices and challenges. *Environmental Engineering and Management Journal*, 9, 1289-1296. 10.30638/eemj.2010.167.

- Paya, C. (2016). An Integrated System of Waste Management in a Developing Country Case Study: Santiago de Cali –Unpublished Master’s Thesis, Colombia.
- Purcell, M. & Magette, W. L. (2010). Attitudes and Behaviour Towards Waste Management In The Dublin. *Waste Management Journal*, 11(6), Ireland Region.
- Rae N. A. (1999). Livestock and environment. *Report to the foundation for research science and technology*. The NZ Institute of Economics Research, Wellington.
- Rodić V. (2006). The influence of instruments for environmental protection to livestock production. *Journal of Contemporary Agriculture*, 55(9), 42-47.
- Rodić, V., Perić, L., Pavlovski, Z. & Milošević, N. (2010). The environmental impact of poultry. Improving the poultry sector in Serbia: Major economic constraints and opportunities. *Worlds Poultry Science Journal*, 66(2), 241-250.
- Rosell, M. (2011). SWOT analysis for the improvement of municipal solid waste management planning. A case study of Iribarren municipality. Unpublished Master’s Thesis, Venezuela.
- Salha, M. K. & Mansoor, A. (2006). Solid waste collection by private sector: Households’ perspective. Findings from a study in Dar es Salaam city, Tanzania. *Habitat International Journal*, 30(4), 769-780.
- Shankar Pandey, D., Kwapinska, M., Leahy, J. and Kwapinski, W. (2019). Fly Ash From Poultry Litter Gasification – Can it be Utilised in Agriculture Systems as a Fertiliser?. *Energy Procedia*, 161, pp.38-46
- Shaw, P. J. (2008). Nearest neighbour effects in kerbside household waste recycling. *Journal of Resources, Conservation and Recycling*, 52(5), 775-78.
- Shekdar A. V. (2009). Sustainable solid waste management: An integrated approach for Asian countries. *Journal of Waste Management*, 29, 1438-1448.
- Statitics Canada (2005). Solid waste in Canada. Annual Statistics .*Catalogue 16(201)*.

- Suttibak, S., & Nitivattananon, V. (2008). Assessment of factors influencing the performance of solid waste recycling programs. *Journal of Recourses, Conservation and Recycling*, 53(1-2), 45-56.
- United Nations Human Settlements Programme (UN-HABITAT) (2010). Collection of municipal solid waste in developing countries. Nairobi.
- Wastes Browse EPA (2012). Landfill diversion. Available at: https://en.wikipedia.org/wiki/Landfill_diversion. Accessed on 12 July 2018.
- Williams, M., Barker, J. & Sims, J. (1999). Management and utilization of poultry wastes. *Journal of Environmental Contamination Toxicology*, 162, 105–157.
- Yousuf, T. B. (2014). 3R (reduce, reuse and recycle) in Bangladesh. In Municipal solid waste management in Asia and the Pacific Islands., Springer. Edited by Agamuthu Pariantamby and Masaru Tanaka. *Journal of Environmental Science and Engineering*, 7(4), 61- 67.
- Zhang, K. D. T. S. & Richard. M. (2010). A comparison of municipal solid waste management in Berlin and Singapore. *Journal of Waste Management* 30, 921-933

Annex 1: Questionnaire

**NEAR EAST UNIVERSITY
DEPARTMENT OF ENVIRONMENTAL EDUCATION AND
MANAGEMENT**

Dear participant,

You are kindly invited to be part of this study titled, “**Poultry Waste Disposal Implications and its Environmental Awareness Challenges in Libya**”. This questionnaire is intended to be filled by Poultry farmers within Tripoli district, Libya. I thank you in advance for your understanding.

Section A: Demographic profile of respondents.

1) Marital status?

- Single
- Married
- Divorced
- Widow

2) Age?

- 18-25
- 26-30
- 31-35
- 35 and Above

3) Gender?

- Male
- Female

4) Number of years in poultry farming?

- Below 5 years
- 5-10 years

- Above 10 years
- 5) Purpose of poultry farming?
- Commercial purpose
 - House hold consumption
 - For both household consumption and commercial purposes
- 6) Formal education level?
- Never been to school
 - A-level
 - Diploma
 - Degree
- 7) How large is your poultry farm?
- Less than 2 acres
 - 2-5 acres
 - 6-10 acres
 - More than 10 acres
8. How many Kilograms (approximately) of poultry waste is generated on your farm per day?
- 1 kg
 - 5kg
 - 10kg
 - Above 10kg
9. Do you have a storage receptacle for poultry waste in your farm?
- Yes
 - No
10. What is the type of waste generated from your poultry farm made of?
- Plastic
 - Metal Above 10kg

- Wood (Bamboo)
- Feathers
- feeds
- Others (Specify

11. What are the main problems you encounter in poultry waste storage?

- Awful smell
- Complaints from neighbors

12. How do you dispose off your poultry waste?

- Take it to the nearby secondary storage receptacle (Dustbin)
- Dig a hole around the house/in the village and bury or burn it **Wood (Bamboo)**
- Throw it on an open space or on the street
- Throw it in to the nearby river Others (Specify
- Private collectors take it

13. A)How much do you pay for this service per month? (???)

- Take it to the nearby secondary storage receptacle (Dustbin)
- Digging a hole around the house/in the village and bury or burn it Wood (Bamboo)
- Throw it on an open space or on the street
- Throw it in to the nearby river Others (Specify
- Private collectors take it

14) How many times do government agencies collect your generated poultry waste per week?

- once
- Twice
- More than Twice

15) Are you satisfied with their service?

- Yes
- No

16. Are you satisfied with the existing poultry waste collection and disposal you are practicing?

- Yes
- No

17. What do you suggest to improve poultry waste management?

- Practice mixed waste disposal
- Use waste for other Agricultural processes
- Dispose waste in landfills
- Dispose waste in rivers/water bodies

18. **Who do you think is responsible for proper management of poultry waste????)**

- Prevent disease spread
- Economic purpose
- Solve problem of energy generation
- Curtail expenditure
- Others.....

19. Which of the following do you think is the best institute to handle poultry waste management?

- Individuals
- Community heads
- Farmers associations
- Government
- Municipal Corporation
- Private Companies

20. Would you be willing to pay to improve poultry waste management service?

- Yes
- No

Section B: Environmental awareness through the media

21) What is your preferred way of getting information regarding poultry waste management?

- Through the media
- Through phone
- From extension farmers meetings
- Others.....

22) Which media do you use frequently?

- Radio
- Television
- Newspaper
- Magazine

23) How much do you agree with the following statement “media have a great role in creating awareness on environmental matter?”

- Very true
- True
- Somehow true
- Not true

24) What is your level of satisfaction derived from the media on proper solid waste management?

- Completely satisfied
- Somewhat satisfied
- Don't know
- Not satisfied

Section C: Lack of environmental educators.

25) Have you had a chance of being thought by environmental educators?

- Yes
- No

26) What factor hinders you from getting information from environmental educators on poultry waste management?

- Difficult to locate their office
- Have many appointment to make
- Doesn't visit my area regularly

27) Do you find the information received from extension officers useful in overcoming waste management challenges?

- Very useful
- Moderately useful
- Not useful (Am not leaning something new)

28) Which of these training programs have you participated ?

- Field/home visit
- Waste management orientation
- Agro allied conferences
- Others.....

Section D: Personal interest in environmental sustainability

Please respond by ticking the box that represents the extent to which you agree or disagree about the following statement.

| S/N | Question | Strongly agree | Not sure | Disagree | Strongly disagree |
|-----|--|----------------|----------|----------|-------------------|
| 29 | Cleanliness of the city is the responsibility of the general public | | | | |
| 30 | Solid waste environmental pollution is not real | | | | |
| 31 | Maintaining economic growth is more important than protecting the natural environment | | | | |
| 32 | If poultry waste is not properly managed, we will soon experience a major ecological catastrophe | | | | |
| 33 | I am very well informed about poultry waste management | | | | |

Section E: Government interest in propagating environmental awareness.

34. Has there been any solid waste management program organized by the government for poultry farmers in your area?

- Yes
- No

35. If the answer to **question 21 above** is “yes”, how often is the program held?

- Regularly
- Once in a week
- Once in a month
- Once a year

36. Who is responsible for awareness of solid waste environmental pollution?

- Citizens
- Government

37. So far, how would you rate the government effort in creating awareness?

- Very good
- Good
- Fair
- Bad
- Very bad

38. Government extension programs will help educate me on proper waste management

- Very true
- True
- Somehow true
- No

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