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RESEARCH ARTICLE

WASTE FROM FOOD CHAINS AND TRANSMISSION OF ZOONOTIC DISEASES

Kasamba IE[1], Kalumba K A[1], Mbuyi Ngandu Fabien[1] and Malangu M.E.P[1,2]

1. University of Lubumbashi, Faculty of Medicine, Department of Biomedical Sciences.
2. University of Lubumbashi, Faculty of Veterinary Medicine.

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Abstract

Many, if not most, important zoonoses are linked in some way to animals participating in the food production chain. Food therefore becomes an important vehicle for many zoonotic pathogens.We focused here on the risk to human health linked to zoonotic microorganisms present in waste generated by food chains and carried by rodents and insects.It appears from our results that poor management of waste from stores was noted with all the consequences on the possibility of contact between rodents and arthropods, moreover the risk of transmission of zoonotic diseases as well as on the climate by production of gases with environmental effects. greenhouse, consequence of poor waste disposal methods by burning and putrefaction during the storage of household waste.In view of the above, the risk of transmission of zoonotic diseases is evident in the current conditions of our food chains.

Introduction:-

Poor solid waste (SD) management is a global problem in terms of environmental contamination, social inclusion and economic sustainability [7 , 8], which requires integrated assessments and holistic approaches for its solution [9].

Uncontrolled disposal generates serious heavy metal pollution in water, soil and plants [10], open air combustion causes CO, CO_2, SO, NO, PM_{10} and other emissions of pollutants that affect the atmosphere [11], the collection of waste in open dumps poses serious health risks to people working in these areas [12], the release of SW in the plans water improves marine waste on a global scale, thus increasing environmental contamination [13]. Poor management of SW is the cause of serious and varied environmental and social impacts, which do not allow improvements in sustainable development.

Objective:-

This article reviews the main impacts due to poor waste management to understand the links between poor solid waste management, exposure and associated adverse health effects with the involvement of rodent and waste contact insects . The framework will facilitate the understanding of relationships, interconnections, and the identification of potential points of intervention.

Corresponding Author:- Kasamba IE
Address:- University of Lubumbashi, Faculty of Medicine, Department of Biomedical Sciences.

Methods:-

Study sites.

The city of Lubumbashi in the Haut Katanga province in DR Congo served as the site for our study. Establishments selling food products: butchers, delicatessens, restaurants, and food depots were concerned in this study

Questionnary and survey procedure.

The survey Questionnary included questions related to the waste management process, safety, and hygiene as well as ways to combat contact between insects and rodents and waste. It was designed to last 10 to 15 minutes and included a mix of closed and open-ended questions. The questionnary was pretested to assess its length and clarity.

Participants were informed that their participation was voluntary and of their freedom to stop the interview at any time or refuse to answer certain questions.

The investigation team divided into two groups to conduct the investigation. One group conducted the interview in French with those who spoke the language well. For those who could not communicate in French, a second group conducted the interview through a translator fluent in Swahili, the main language spoken locally. Responses were collected on laptops using the questionnary on google form.

Design

This is a cross-sectional study among residents of the city of Lubumbashi on waste management in food chains and risk of transmission of zoonotic diseases. A total of 3771 responses were received and analyzed using Epi info 7.3 and Office Excel 2013 and are presented in the form of tables, pie charts and histograms.

Results and Discussion:-

We gathered a total of 3,771 responses from different medical structures and the results gave us the following results:

From Figure 1, we observe that 39% of our responses came from store deposits, 21% from butchers, bakeries, and restaurants, each of which responded to us at 20%. the means of eliminating waste in these establishments were trash cans in 70% of cases, waste trucks in 21%, and elimination by subcontractor in 9% of cases.

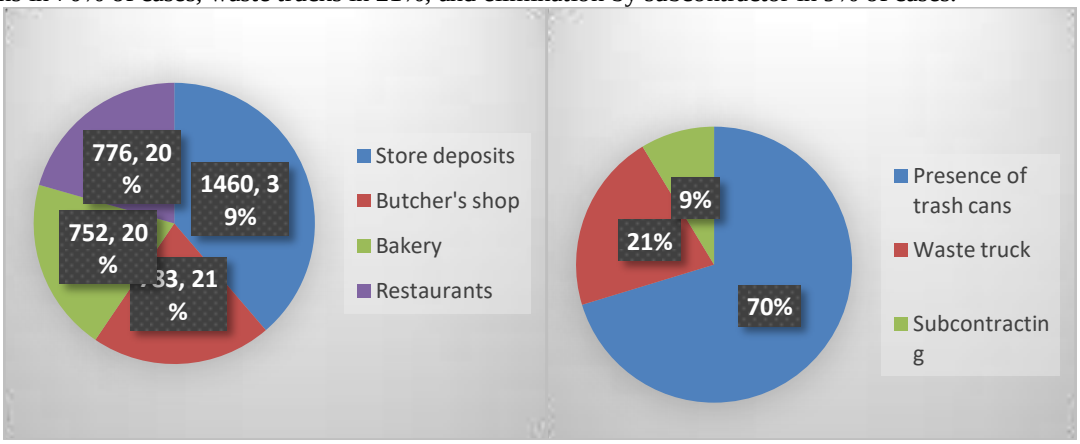

Figure. 1:- Types of stores and means of waste disposal.

As in our study, food waste, paper, plastic, glass, textile waste, wood and other materials are examples of such waste. These materials cannot decompose naturally and take longer to deteriorate, requiring an urgent alternative method to alleviate this problem [14,15]. This waste is collected in trash cans and in waste trucks, which unfortunately are filled to overflowing, thus attracting rodents and various insects. Livestock pathogens are subject to pressures resulting from the production, processing and retail environment which together alter the rate of host contact, population size and/or feed flows. microbial traffic in the food chain.

Waste is sorted according to the types of bins identifiable according to the color code: Yellow, green, or blue, it should be noted from this table that the waste is collected in the different bins without any restriction, the same waste was present in the different trash cans.

Studies have demonstrated that waste sorting behaviors in the population are affected by government instruments or organizational support from external factors [16,17], as well as personal psychological factors from internal factors [18,19]. The government and organizations establish regulations that define a waste disposal system limiting clandestine behavior of populations caused by the positive externalities of waste treatment [20,21]. However, environment-related policies are highly uncertain and policy outcomes may not be demonstrated immediately, leading individuals' policy choices to change based on perceived benefits [16,18].

As in Hubei in China, it is certain that waste sorting could produce a series of effects on well-being, particularly environmental and social, which would improve the perception of benefits by individuals [22].

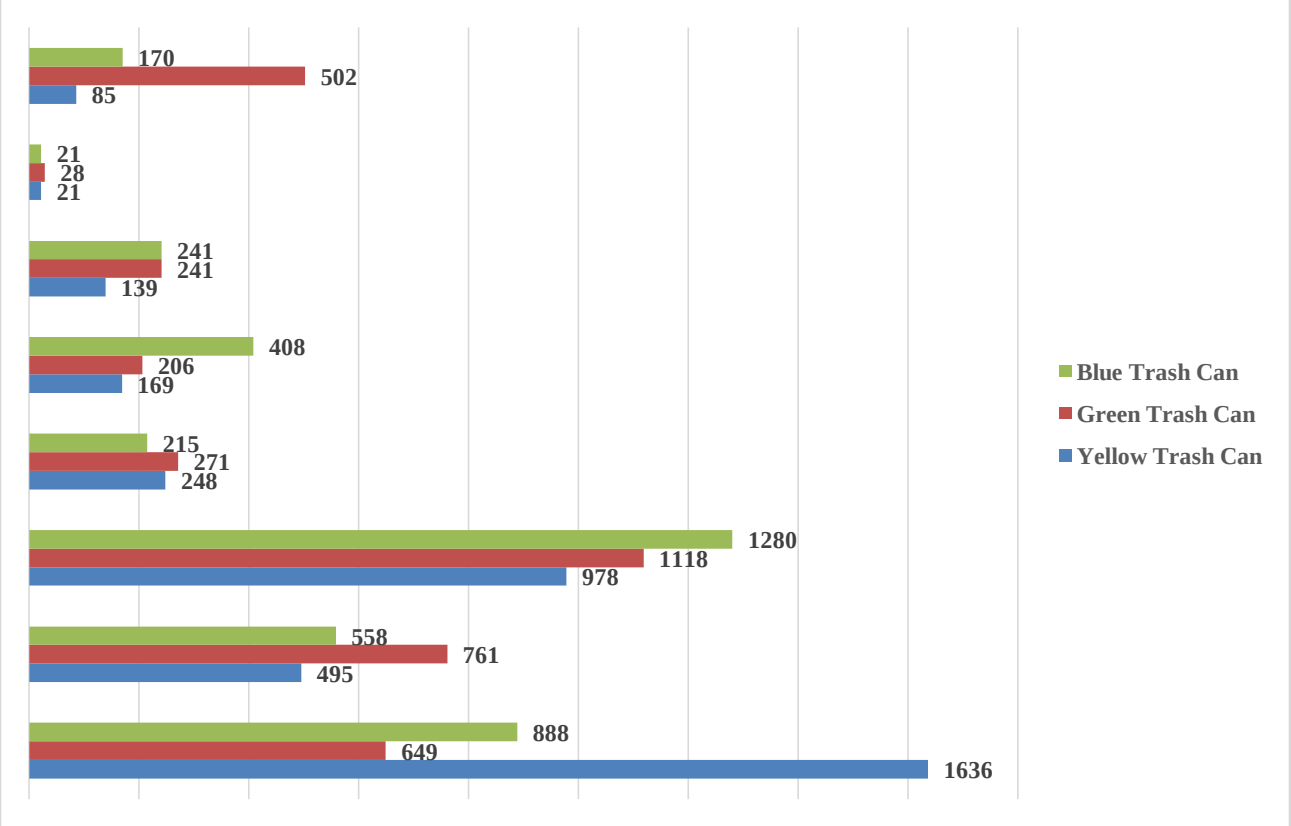

Figure 2:- Type of trash cans used.

Most of the waste is incinerated (burned) (62%), 17% is recycled in field composting, 12% as animal feed, and 3% respectively as garden composting, methanization and discharge into wastewater.

And yet,Open burning releases harmful chemicals and particles that harm human health and the environment. The type of pollutants emitted depends on what is burned. Smoke from burning vegetation and organic matter contains toxic gases such as carbon monoxide, carbon dioxide, other greenhouse gases, nitrogen oxides, hydrocarbons, and sufficiently small particles to enter the lungs and affect the respiratory system[23]. These plastics are made up of synthetic organic polymers which are widely used in different applications ranging from water bottles, clothing, food packaging, medical supplies, electronic products, construction materials, etc.[24] and today, environmental pollution by plastic waste is now widely recognized as a major environmental burden[25]. Indeed,the amount of plastic produced in the first ten years of this century will approach that produced in the entire century before it.[26]

Proposals for incineration of plastic waste use catalytic pyrolysis to conduct the conversion at lower temperatures than those adopted by thermal pyrolysis, to implement a selective reaction towards the desired products, emissions are obtained of lower dioxins compared to those of thermal pyrolysis and conventional combustion. Additionally, as the reaction is conducted in the absence of oxygen, carbon dioxide emissions are also reduced [27].

Even if pollutant emissions from pyrolysis installations are lower and of different composition compared to those from controlled combustion [28].

Also, putrescible, and non-hazardous solid waste such as crop residues, leaves, grass, and animal manure can be managed on-site by composting. Composting is a controlled process in which this type of waste is collected in an open pit or pile and decomposed by natural biological processes. Waste is broken down by the action of various microscopic organisms and other small organisms. The waste is transformed into a stabilized material that can be used as fertilizer. Composting is an ecological way to recycle organic waste.[29]

Transforming food scraps into useful animal feed is a viable solution that can help reduce environmental damage. Although it is normal to use leftover human meals to feed livestock, scientifically authorized production methods and certified quality feed production are essential for healthy livestock production in all regions.[30]

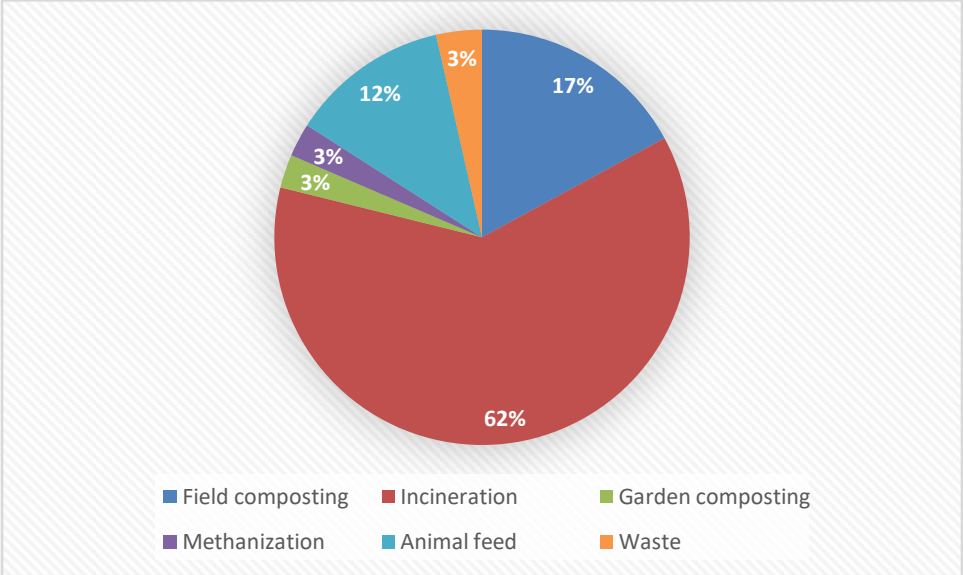

Figure 3:- Waste recovery.

Rodent waste contact is made by Raticides for 73.87% of cases, mesh 52.82% of cases and against insects, anti-insect lamps for 44.55% of cases and Mosquito net in 21.63% of cases. Indeed, close contact with animals is crucial for transmission. The role of intensity and type of contact between livestock and humans in disease transmission is poorly understood. Authors believe that close contact with livestock was not necessary for a transmission event to occur, but that already living near livestock may be sufficient for effects to occur. harmful to the health of residents.[31]

Insect prevention and control are necessary to prevent the transmission of pathogens that can affect animal and human health and to maintain good hygiene [32] . indeed, disease epidemics are increasing in scope and magnitude as urban populations grow, climate change creates new suitable vector climates, and immunologically naive populations are newly exposed. Sustainable solid waste management is crucial for prevention, especially in urban environments that favor urban vectors such as Aedes species[33]; Ibrahim identified thirty-three arthropod species were collected from the Deschutes Municipal Silica Landfill of Urmila. Five insect species were hypermetabolic, including medically important species, Periplaneta americana Linnaeus (Blattodea: Blattidae) and Shelfordella lateralis Walker (Blattodea: Ectobiidae)[34]; and in Brazil, taxa of 1204 arthropods (insects, arachnids and diplopods) identified with the presence of microorganisms in the final product and found considerable levels of Escherichia coli and Enterococcus faecalis in some samples.[35]

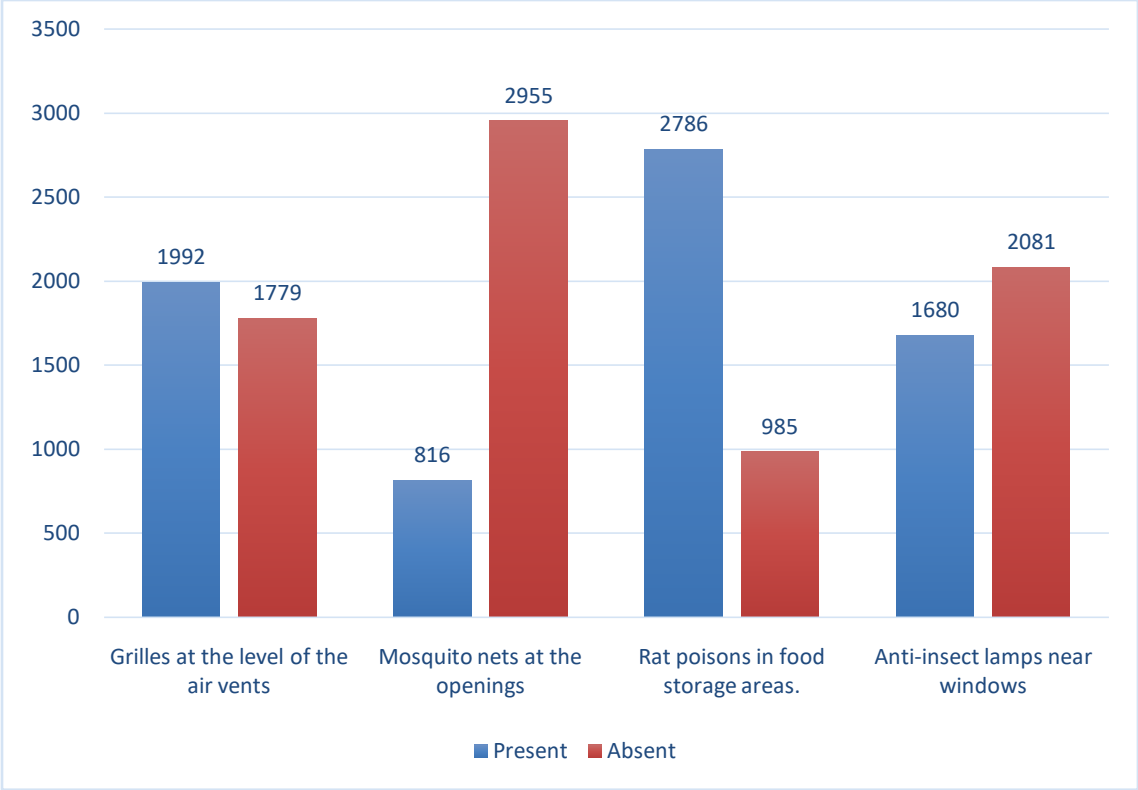

Figure 4:- Barrier against rodents and insects.

Regarding safety and hygiene in food supplies, Figure 5 shows a low level of staff training (22.32%), Procedure for wearing epis (34.15%), medical monitoring in the event of a staff accident (29.30%), implementation of health management plans (24.13%), cleaning 49.90%, maintenance of premises 16.83% and good implementation of equipment maintenance plan 66.51%. Monitoring of waste disposal and shipment control was implemented in 37.09% of cases.

The observation made in this figure is that the waste elimination process is unsafe, in fact, the waste is without any monitoring of both shipping and elimination. And in the disposal area, the waste is in the open air. The availability of food waste to wildlife can have dramatic effects on ecological communities and humans. This can manifest when wildlife ecology and behavior is altered by access to food waste, and when wildlife access to food waste affects other species and ecological processes, thereby tower increases conflicts between wildlife and humans[36,37]. What can easily attract predator's mammals can easily be attracted and promoted increased interaction between wild and domestic animals can facilitate the spread of diseases and pathogens between wild animals, livestock, other domestic animals and sometimes humans . Increased risk of disease transmission (e.g.,rabies, distemper virus) . When collecting food waste, animals' risk consuming plastic and other indigestible waste[38].

Finally, vector-borne urban biological diseases, particularly Aedes-borne diseases, are associated with solid waste accumulation, but vector preferences vary by season and region. Urban zoonoses, particularly rodent and dog disease reservoirs, are associated with solid waste in urban settings, particularly when waste accumulates over time, creating burrow sites and food for reservoirs . Although evidence suggests a link between plastic/solid waste pollution and human disease[40]

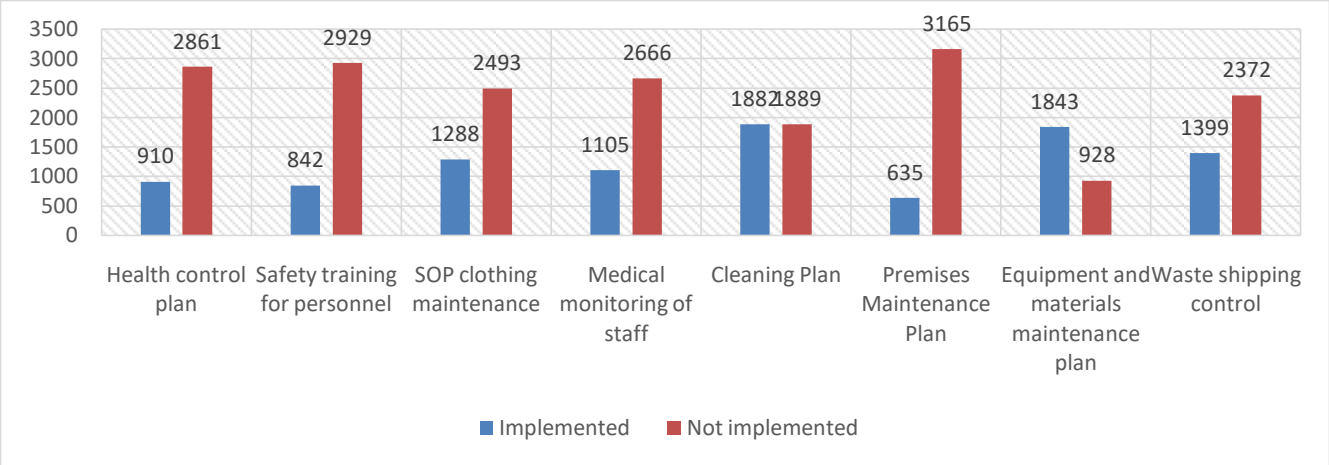

Fig. 5:- Safety and hygiene in food.

Conclusion:-

Disease epidemics are increasing in scope and magnitude as urban populations grow, climate change creates new suitable vector climates, and immunologically naive populations become newly exposed. Sustainable solid waste management is crucial for prevention, especially in urban environments that favor urban vectors such as Aedes species. Vector preferences vary by season and region. Other vectors are associated with waste as burrow, food source and breeding site. And although no further evidence of an association between litter and tick-borne diseases has been found, it is fairly documented for rodent predators and humans; The consumption of solid waste produced by food chains remains a concern. The normative and regulatory texts in this area must be implemented and popularized.

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