Relationship between Environmental Pollution and Different Diseases

(Original Research Article)

[1] Salwa Muftah Eljamay, [2]Amal.Gh.Hashem, [3]Fatma Muftah Eljamay, [4]Najma Ramadan Elhenshir

[1]Department of Public Health, Collage of Medical Technology, Derna \ Libya,
[2]Department of Zoology, Faculty of Science, University of Derna\ Libya
[3] Department of Lab Medicine, Collage of Medical Technology, Derna \ Libya
[4] Department of Public Health, Collage of Medical Technology, Derna \ Libya

Corresponding Author: Salwa Muftah Eljamay, Assistant professor, at Collage of * Medical Technology, Derna \ Libya, Department of Public Health,
Email: salwaelgamay@yahoo.com. salwaeljamay@cmtd.edu.ly

Recieved on: 13 July 2021 **Accepted on: 01 October 2021**

Abstract

Environmental pollution effects on public health. It is **aimed** to found out the relationship between Environmental Pollution and Different Diseases. **Method** was cross-sectional survey from different hospital and polyclinic in Derna city. **Results show** the young ages (> 1 year - 10 years) have high frequency and percent 146 (48.7%) in infected by different diseases, followed by)21 year – 30 year (by 66(22.0 %), S.D(1.24), Mean(2.10), The percent of infected male was 200 (66.7 %) higher than females 100(33.3 %), SD was (0.472), Mean(1.33), the percent of West Accumulation 262(87%), SD(0.33315), mean (1.1267). As for the Insect distribution was 261 (87.0%), the water source the highest percent was for Center Of City by 61(20.3%), followed by plastic tanks 48(16.0%), Metal tanks 46(15.3%), Well 53(17.7%), Mean, (3.3167) SD(1.45031). the tuburcoloisus was have a high percent by 83(27.7%), followed by lice 49(16.3 %), followed by Hepatitis A infection by 48(16%) Chronic Granulomatous Disease (CGD) 34 (11.3 %), Rabbis, 32(10.7 %) ,Typhus 13(4.3 %), and (Hepatitis B , 7(2.3%) , Hepatitis C,6 (2.0%), the Std. Deviation was(3.178), Mean (7.87), The percent of infected Libyan 267(89.0%) was higher than other nationality by 28(12.7 %), Std. Deviation was (0.315), Mean (1.11). P-Value for Living Place, Water Source, west Accumulation and Insect Distribution was < 0.000. The results confirmed that the prevalence of different diseases is closely related with the current environmental situation and The Relationship between Diseases and Living Place, Water Source, and Waste Accumulation & Insect Distribution.

Keywords: Pollution, Chronic Granulomatous Disease, Typhus, Tuburcoloisus, Hepatitis.

Introduction

The burden of disease and death attributable to environmental pollution is becoming a public health challenge worldwide, especially in developing countries, the kidney is vulnerable to environmental pollutants because most environmental toxins are concentrated by the kidney during filtration. Given the high mortality and morbidity of kidney disease, environmental risk factors and their effect on kidney disease need to be identified. In this Review, we highlight epidemiological evidence for the association between kidney disease and environmental pollutants, including air pollution, heavy metal pollution and other environmental risk factors.(Xu et al., 2018), Infectious disease-induced MMEs (ID MMEs) have not been reported ubiquitously among marine mammal species, indicating that intrinsic (host) and/or extrinsic (environmental) ecological factors may influence this heterogeneity.(Sanderson and Alexander, 2020), The synthesis of evidence linking 133 diseases and injuries, or their groupings, to the environment has been reviewed to provide an overall picture of the disease burden that could be prevented through healthier environments.(Prüss-Üstün et al., 2016),

Current and future diagnostic molecular techniques offer new opportunities to identify tools for the management and possible treatment of diseases in imperiled species.(Aguirre and Tabor, 2008), Environmental exposures can dramatically influence the phenotype of allergic diseases, including atopic eczema, food allergy, asthma, and allergic rhinitis , These diseases now affect approximately 20% of the population worldwide, (JCI - Environmental exposures and mechanisms in allergy and asthma development, no date), increasing respiratory illnesses have been observed in urban centers due to diminished air quality. This study evaluated associations between urban air pollutants in the Eastern Caribbean nation of St. Kitts-Nevis during drought and lung function among residents previously at risk for chikungunya infection. (Whittaker et al., 2018), There is more and more empirical research on public health problems caused by environmental problems, but most existing literature focuses on the consequences of air pollution such as mortality , public health and individual health of employees , and the impact of air pollution on government expenditures and personal medical expenditures (Sun et al., 2020). Environmental exposure to pollution from hazardous waste sites is an understudied contributor to the global burden of disease. Increasing industrial development, urbanization and socioeconomic forces in Latin America have contributed to an increase in environmental pollution and the negative health effects resulting from exposure, (Caravanos et al., 2016), Heavy metals are normally occurring elements that have a density at least 5 times higher than of water. Their plentiful domestic, industrial, agricultural and technological usages have led to their widespread distribution in the environment; raising worries over their possible impacts on human health and the environment. The toxicity of heavy metals relies on numerous

factors including the dose, method of exposure, and chemical types.(Hassaan, El Nemr and Madkour, 2016). Exposures to environmental pollutants during windows of developmental vulnerability in early life can cause disease and death in infancy and childhood as well as chronic, non-communicable diseases that may manifest at any point across the life span. Patterns of pollution and pollution-related disease change as countries move through economic development. Environmental pollution is now recognized as a major cause of morbidity and mortality in low- and middle-income countries (LMICs). According to the World Health Organization, pollution is responsible for 8.9 million deaths around the world each year; of these, 94% (8.4 million) are in LMICs. Toxic chemical pollution is growing into a major threat to children's health in LMICs. The disease and disability caused by environmental pollution have great economic costs, and these costs can undercut trajectories of national development.

To combat pollution, improved programs of public health and environmental protection are needed in countries at every level of development. Pollution control strategies and technologies that have been developed in high-income countries must now be transferred to LMICs to assist these emerging economies to avoid the mistakes of the past. A new international clearinghouse is needed to define and track the health effects of pollution, quantify the economic costs of these effects, and direct much needed attention to environmental pollution as a risk factor for disease. (Suk William A. et al., 2016), Tuberculosis (TB) is an airborne communicable disease plaguing human populations since antiquity. TB continues to be a major public health problem globally and India has one of the largest numbers of TB cases in the world. The risk of progression from exposure to tuberculosis bacilli to the development of active disease is a two-stage process governed by both exogenous and endogenous risk factors. Exogenous factors play a key role in accelerating the progression from exposure to infection, whereas endogenous factors lead in progression from infection to active TB disease. Socioeconomic factors are also shown to increase the susceptibility to infection. (Srivastava, Kant and Verma, 2015), less area which infected, was the center of city that the source water from the city's main source (steam plant). This means that water and its sources has a significant role in the pathogenesis of several parasites and other diseases.(Eljamay, 2018), Anthropogenic land use changes drive a range of infectious disease outbreaks and emergence events and modify the transmission of endemic infections. These drivers include agricultural encroachment, deforestation, road construction, dam building, irrigation, wetland modification, mining, the concentration or expansion of urban environments, coastal zone degradation, and other activities. (Patz Jonathan A. et al., 2004) A number of scientific studies have shown that swimmers swallow significant amounts of polluted seawater and can become ill with gastrointestinal and respiratory diseases from the pathogens they ingest. Based on risk assessments from the World Health Organization (WHO) and academic research sources the present study has made an estimate that globally,

each year, there are in excess of 120 million cases of gastrointestinal disease and in excess of 50 million cases of more severe respiratory diseases caused by swimming and bathing in wastewater-polluted coastal waters. Filter-feeding shellfish/bivalves, which are often harvested from wastewater-polluted areas of the sea, can effectively filter out and concentrate the microbial pathogens in the seawater.It can be roughly estimated that annually there are some 4 million cases of infectious hepatitis A and E (HAV/HEV), with some 40 thousand deaths and 40 thousand cases of long-term disability, mainly chronic liver damage, from consuming raw or lightly steamed filter-feeding shellfish /molluscs harvested globally from polluted coastal waters. The total global health impact of the thalassogenic diseases—human infectious diseases associated with pathogenic microorganisms from land-based wastewater pollution of the seas—is estimated to be about 3 million 'disability-adjusted life years' (DALY)/year, with an estimated economic loss of some 12 billion dollars per year.(Shuval, 2003).

Methods

Study Design

A cross – sectional study design was used to conduct the study. The target population focused on different ages from different population. Data collectd from hospital recorders, and questionnaire. The tuberculosis data collected from 2014 to January 2019. This study was conducted during the period from 01\ 2017 to 01\ 2019. The study was conducted from different polyclinic Elheraish, Elsahel, Shaiha polyclinic, (Elsafa privet clinic), Martouba, in Derna city.-++

Statistical Analysis

The frequency and descriptive data was given as a mean ± standard deviation (SD). The Statistical package for the Social Science (SPSS) version 26 under Microsoft Windows was used for data analysis, correlation, X2, and P-Value.

Table (1). Illustrated the Demographics and Background Characteristic, frequency, percent, mean & SD

Demographic parameters	Frequency	Percent %	Mean	SD
Gender				
Male	200	66.7	1.33	0.472
Female	100	33.3		
Nationality				
Libyan	**267**	**89.0**	1.11	0.313
Non Libyan	33	11.0		
West Accumulation				
Yes	**262**	**87.3**	1.126	0.3331
No	38	12.7	7	5

Insect accumulation				
Yes	**261**	**87**	1.130	0.3368
No	39	13	0	7
Age				
> 1 year - 10	146	48.7		
11 - 20 years	39	13.0		
21 - 30 years	66	22.0	2.10	1.241
31 - 40 years	38	12.7		
41 - 50 years	11	3.7		
Water Source				
Plastic Tanks	48	16.0		
Metal Tanks	46	15.3	3.316	1.4503
Center Of City	**61**	**20.3**	7	1
Well	53	17.7		
Diseases				
Viral gastroenteritis (stomach flu)	14	4.7		
Meningitis	3	1.0		
Chronic Granulomatous Disease	**34**	**11.3**		
(CGD)	4	1.3		
Jundus	7	2.3		
Hepatitis B	6	2.0		
Hepatitis C	13	4.3	8.69	3.469
Typhus	2	0.7		
whipping cuph	**83**	**27.7**		
Tuburcoloisus	**32**	**10.7**		
Rabbis	**49**	**16.3**		
Lice	5	1.7		
Mountain Fever	**48**	**16.0**		
Hepatitis A				
Living Place				
City Center	42	14.0		
Shaiha	34	11.3		
Elsahel	123	41.0		
Bab-Tubrouk	35	11.7	3.370	1.6478
Elfataih	25	8.3	0	7
Karsa	20	6.7		
Martuba	21	7.0		
Total	300	100.0		

In table (2) the p-value = 0.000 > 1 for Diseases & Living Place, Water Source, Wast Accumulation,& Insect Distribution that indicate to there was relationship between Diseases & Living Place, Water Source, Nationality & Wast Accumulation. Also result in figure (1, 2, 3, 4 ,& 5) It is apparent the relationship between Diseases & Living Place, Water Source, Nationality & Wast Accumulation, the study agree with pervious study as in the (Kumar, Meena and Verma, 2019), which, providing knowledge to the public of Pakistan regarding the adverse effects that water pollution is having on the human health and welfare in Pakistan and moreover, the negative consequences that Pakistani economy faces due to the deteriorating condition of water resources in the country, (Sun *et al.*, 2020), which prove that Given the high

level of the nation's economic development and the results of efficiency in water pollution and water diseases, improving the efficiency and quality of wastewater treatment in China is regarded as an important factor for achieving the strategic goal of green growth.(JCI - Environmental exposures and mechanisms in allergy and asthma development, 2020), (Aguirre and Tabor, 2008) which find out that the Disease can be catastrophic to a diminished stressed population, becoming in some instances the leading factor of local, regional, and global extinctions.

The strategies of the new field of conservation medicine include long-term monitoring, health assessment, and interventions to protect species at risk. Particularly must minimize the threat of any potentially catastrophic disease outbreaks resulting from anthropogenic changes to the environment. Current and future diagnostic molecular techniques offer new opportunities to identify tools for the management and possible treatment of diseases in imperiled species.(Shuval, 2003) .

This study agrees with .Environmental pollutants, including metals, air pollutant, phthalate and melamine can potentially increase the risk of CKD or accelerate its progression. (Tsai *et al.*, 2021), also described the importance of flies in relation to disease.In Table (2) the p-value = 0.000 > 1 for Diseases & Living Place, Water Source, & Wast Accumulation, from the obtained result in the table (2) prove that there was relationship between Diseases & Living Place, Water Source, Nationality, Wast Accumulation, & Insect Distribution

Table (2). The Relationship between Diseases and Living Place, Water Source, Waste Accumulation and Insect Distribution

P-Value.	X^2	
0.000	318.713	Diseases
0.000	183.933	Living Place
0.000	23.567	Water Source
0.000	167.253	West Accumulation
0.000	39.009	Insect Distribution
0.000	182.520	Nationality

It is apparent from the result in figure (1, 2, 3, and 4) the relationship between Diseases & Living Place, Water Source, Nationality, West Accumulation, and Insect Distribution.

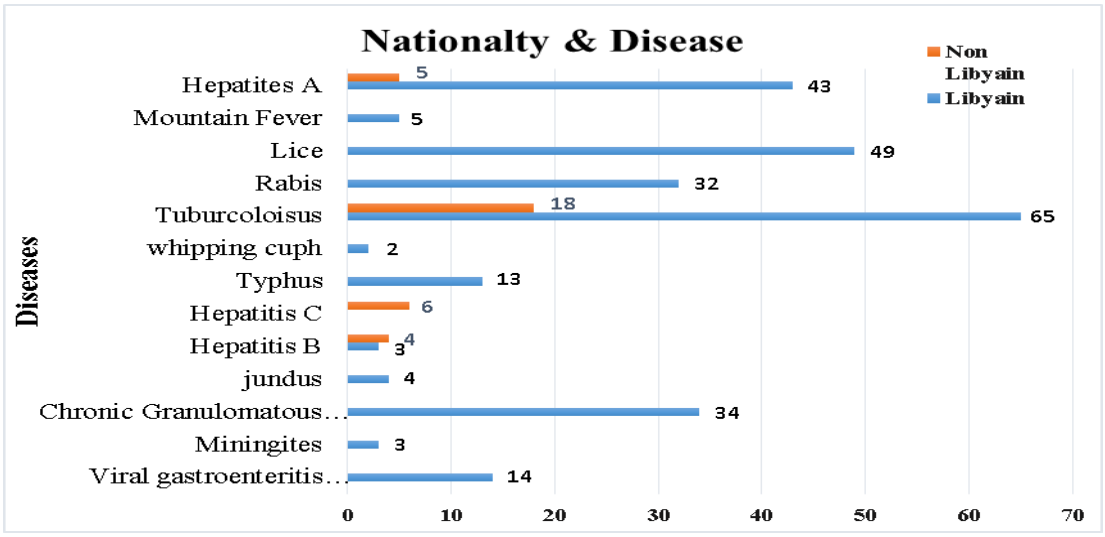

Figure (1). The Relationship between Diseases and Nationality.

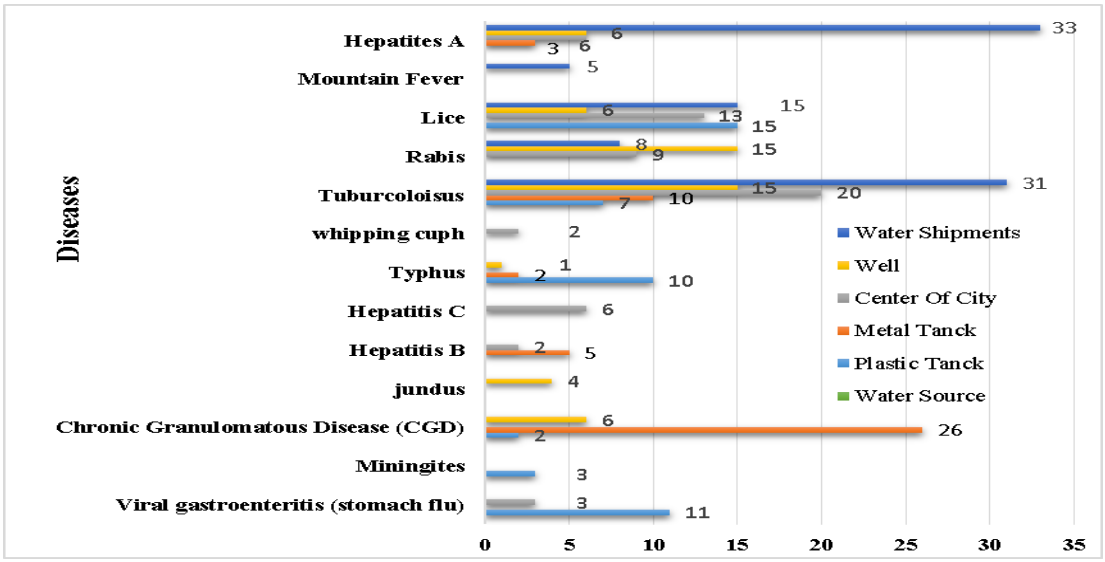

Figure (2). The Relationship between Diseases and Water Source.

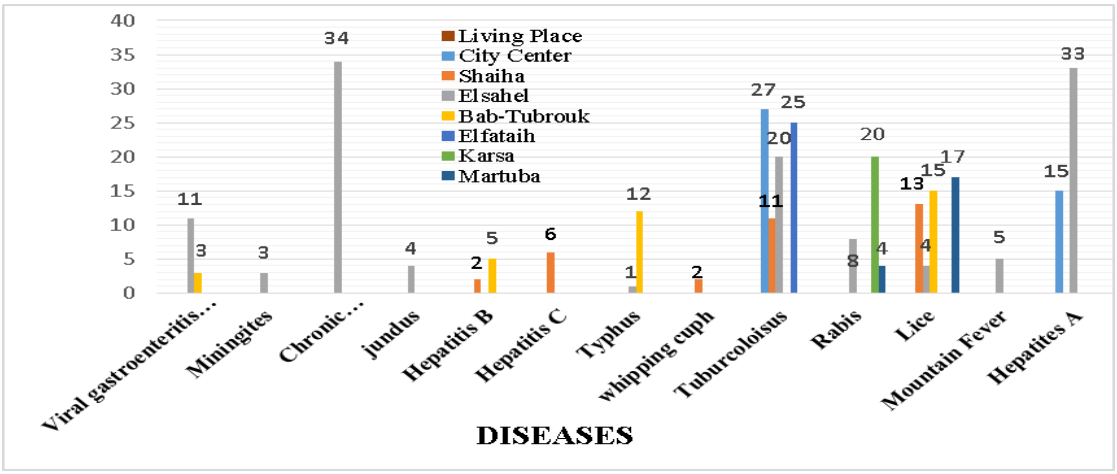

Figure (3). The Relationship between Diseases and Living Place.

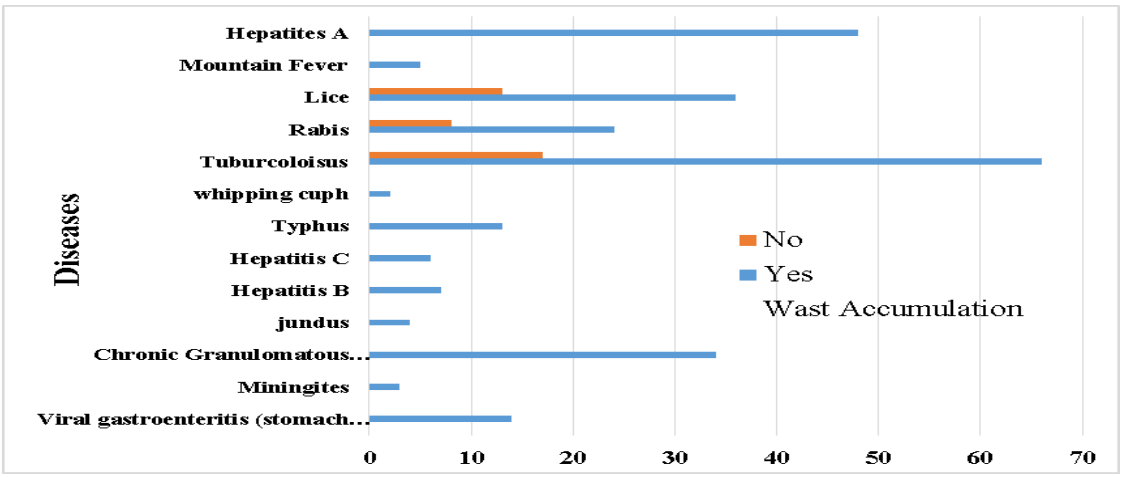

Figure (4). The Relationship between Diseases and West Accumulation.

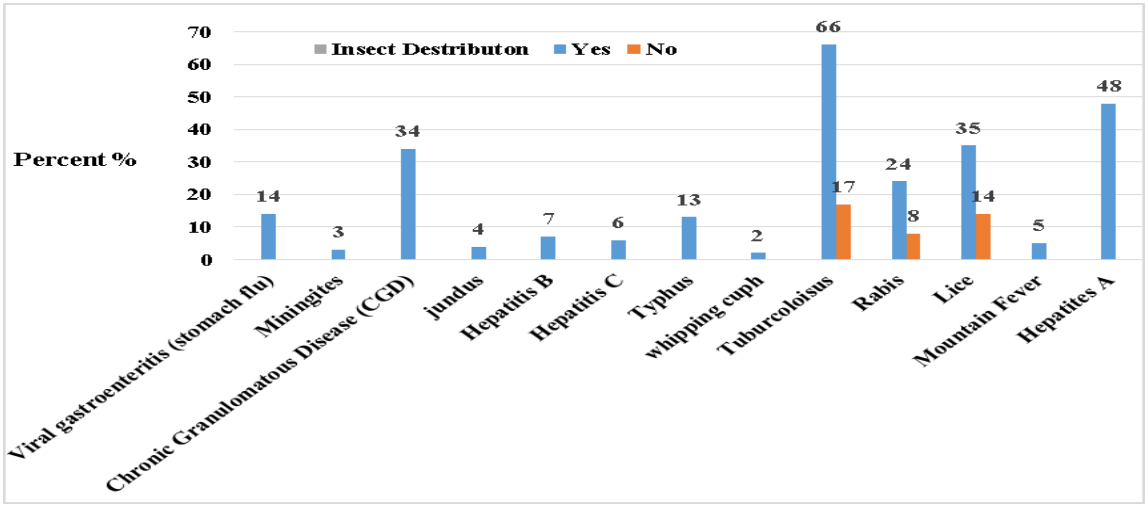

Figure (5). The Relationship between Diseases and Insect Distribution.

All the publications mentioned above give indirect evidence for the transmission by flies of the causative organisms of diarrhea and related diseases. (Wolff and Van Zijl, 1969), Arthropod vectors are responsible for the transmission of many infectious diseases. Currently, more than three billion people living in endemic areas are exposed to vector-borne pathogens.

Substantial differences in the biology of arthropod vectors make it extremely challenging to predict the incidence of vector-borne diseases in the future. (Wilke, Beier and Benelli, 2019), Despite the critical role that contact between hosts and vectors, through vector bites, plays in driving vector-borne disease (VBD) transmission, transmission risk is primarily studied through the lens of vector density and overlooks host–vector contact dynamics.(Thongsripong *et al.*, 2021), (Suleman, Darko and Agyemang-Duah, 2015).

Rotten organic materials pose great public health risks, including serving as breeding grounds for disease vectors. “Improper solid waste disposal leads to substantial negative environmental impacts (for example, pollution of air, soil and water, and generation of greenhouse gases from landfills), and health and safety problems (such as diseases spread by insects and rodents attracted by garbage heaps, and diseases associated with different forms of pollution, the final disposal sites from the houses showed that, residents living closer to open dump sites have contracted related diseases such as malaria skin infections among others as result of improper refuse disposal.

It is therefore recommended that final disposal sites for solid wastes should be sited outside residential area, especially the open dumpsites to avoid proliferation pest and diseases. It is further recommended that residents in the area should insist on using mosquito nets to avoid being biting by mosquitoes. In like manner, the district assembly in the study area should provide health education to the people on how to live in good health. Significantly, if the recommendations of this study are considered and implemented, there is a high tendency of improving the solid waste disposal situation and health risks among residents in the Sawaba community to have a clean environment. (Suleman, Darko and Agyemang-Duah, 2015), S ocial insects are an ideal system to study the potential role of social network plas- ticity in disease defense.

The networks of social and physical interactions of insect, vertebrate, and human societies share many properties that are known to influence disease spread, (Stroeymeyt *et al.*, 2018), Adult house flies, *Musca domestica* L., are mechanical vectors of more than 100 devastating diseases that have severe consequences for human and animal health. House fly larvae play a vital role as decomposers of animal wastes, and thus live-in intimate association with many animal pathogens. (Scott *et al.*, 2014), Inadequate collection and improper disposal of municipal waste have a direct negative impact on cities. Disease occurrence in Obio-Akpor (Port Harcourt metropolis, Nigeria) was suspected and linked to the proliferation of dumpsites and proximity to residential households. Evidence showed frequent incidence of diseases outbreak coupled with the topographic coastal nature and the morphological propelling dynamics of sediments transport in the area assisting the situation. (Okpara, Kharlamova and

Grachev, 2021), the findings revealed that increasing age was associated with an increased likelihood of having both knowledge and positive attitude associated with human activities on mosquito species. Results further indicated that increase in age was associated with decreased likelihood of participants practicing human activities that contribute to breeding of mosquito species. Findings also revealed that males were 7.026 times more likely to have knowledge associated with human activities on mosquito breeding than their female counterparts, (Nzewuihe *et al.*, 2021),

The differences between prevalence of symptoms between two groups were significant in all parts of body except knees. The study found that solid waste workers have more musculoskeletal disorders than general population. Meanwhile these symptoms were more common among foreign workers. The risk of disease was increased with the increasing years of working as solid waste worker and smoking. they didn't find relationship between musculoskeletal disorders and education or marriage status of workers. (Mehrdad *et al.*, 2008).

There were significant differences in the effect of workers' length of employment, injured part of body, type of accident, agency of accident, and collection process. Results show that most injuries occur in workers in their 50s and older. This study also shows that 51.4% of injuries occur at businesses with 49 employees or fewer. Injuries to waste collectors happen most often when workers are electrocuted after slipping on the ground. The second most prevalent form of injury is falling, which usually happens when workers hang from the rear of the truck during transportation or otherwise slip and fall from the truck. Work-related illnesses amongst waste collectors are mostly musculoskeletal conditions due to damaging postures.

These findings will be instructive in devising policies and guidelines for preventing workplace injuries and work-related illnesses of HWCs.(Jeong, Lee and Lee, 2016), house flies, *Musca domestica* (Diptera: Muscidae), require a message with evolving (sensu changing over time) information content. Gravid females reportedly deploy a pheromone that induces concerted oviposition so that many even-aged larvae ameliorate the resource, such as animal manure. However, continued oviposition by late-arriving females may result in age disparity and cannibalism of larval offspring.(Lam *et al.*, 2007), Exposures may occur *via* a range of pathways and exposure processes. Individual pollutants may be implicated in a wide range of health effects, whereas few diseases are directly attributable to single pollutants. Long latency times, the effects of cumulative exposures, and multiple exposures to different pollutants which might act synergistically all create difficulties in unravelling associations between environmental pollution and health. Nevertheless, in recent years, several attempts have been made to assess the global burden of disease as a result of environmental pollution, either in terms of mortality or disability-adjusted life years (DALYs).

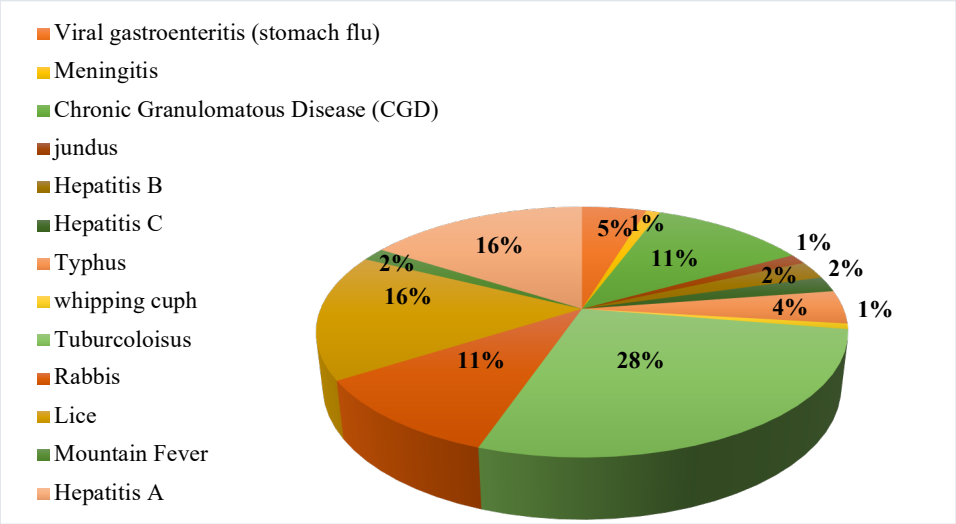

Figure (6). Percentage of Disease Distribution.

About 8–9% of the total disease burden may be attributed to pollution, but considerably more in developing countries. Unsafe water, poor sanitation and poor hygiene are seen to be the major sources of exposure, along with indoor air pollution.(Briggs, 2003). Insect vectors of human diseases are embedded within complex ecological communities. Their interactions with other species, particularly alternative hosts, have important consequences for disease transmission and dynamics., Blood-sucking insects are important vectors of disease, with biting Diptera (flies) alone transmitting diseases that cause an estimated 700 000 human deaths a year. Insect vectors also bite nonhuman hosts, linking them into host-biting networks. While the major vectors of prominent diseases, such as malaria, yellow fever, dengue, and Zika, are intensively studied, there has been limited focus on the wider interactions of biting insects with nonhuman hosts. Drawing on network analysis and visualisation approaches from food-web ecology, we discuss the value of a network perspective for understanding host–insect–disease interactions, with a focus on Diptera vectors. Potential applications include highlighting pathways of disease transmission, highlighting reservoirs of infection, and identifying emerging and previously unrecognised vectors. (Bellekom, Hackett and Lewis, 2021).

There is evidence that climate change is increasing the frequency of vector-borne diseases and may contribute to increasing the virulence of their pathogens, there are very few studies conducted in Haiti on the relationship between climate change and vector-borne diseases. The purpose of this chapter is to define the interrelationships between climate change and vector-borne diseases in Haiti by identifying avenues of research to better understand the effects of climate change on public health and to make appropriate recommendations to decision-makers to ensure proper management. (Balthazard-Accou *et al.*, 2021). There are two diseases concerning which the evidence against the house fly seems to be decidedly incriminating. These two diseases are typhoid fever and the diarrhoeal disease of infancy. In the matter of typhoid fever, Dr. Terry, health officer of Jacksonville, Fla., has greatly reduced the deathiate by cleaning up vacant.lots, by screening privies and outside toilets and by other methods directed not only toward the elimination of flybreeding nuisances, but also towiard the

destruction of fly-infecting nuisances. The contrast to Jacksonville and other southern communities, which northern cities make by the comparative absence of privies, vacantlot contamination, etc., makes it likely that this method of transmission of typhoid fever is comparatively rare in these better sanitated communities. (Armstrong, 1914).

Conclusion

The results confirmed that the prevalence of different diseases is closely related with the current environmental situation and The Relationship between Diseases & Living Place, Water Source, and West Accumulation & Insect Distribution.

Acknowledgement

I would like to thank Alla and everyone how help me.

References

1. A. A. Aguirre, *et al*, (2008) 'Global Factors Driving Emerging Infectious Diseases', *Annals of the New York Academy of Sciences*, 1149. doi: 10.1196/annals.1428.052.

2. S. Ahmad, *et al.* (2019) 'The Impact of Water Pollution on Economic Development of Pakistan', *International Journal of Science and Business*, 3(4), pp. 86–95. doi: 10.5281/zenodo.3339874.

3. D. B. Armstrong, (1914) 'An Investigation Into the relationship of the house fly to disease-the special importance of the fly in infant welfare', *American Journal of Public Health*, 4(3), pp. 185–196.

4. K. Balthazard-Accou, *et al.* (2021) 'Vector-Borne Diseases and Climate Change in the Environmental Context in Haiti'.

5. B. Bellekom, *et al.* (2021) 'A network perspective on the vectoring of human disease', *Trends in Parasitology*.

6. D. Briggs, (2003) 'Environmental pollution and the global burden of disease', *British Medical Bulletin*, 68(1), pp. 1–24. doi: 10.1093/bmb/ldg019.

7. J. Caravanos, *et al.* (2016) 'Burden of disease resulting from lead exposure at toxic waste sites in Argentina, Mexico and Uruguay', *Environmental Health*, 15(1), p. 72. doi: 10.1186/s12940-016-0151-y.

8. S. Eljamay, (2018), Prevalence of Parasite among School Children in Derna City, Vol. 12(1) *PCBSJ,* DOI:10.163.pcbsj/2018.12.-1-59

9. M. A. Hassaan, El Nemr, A. and Madkour, F. F. (2016) 'Environmental assessment of heavy metal pollution and human health risk', *American Journal of Water Science and Engineering*, 2(3), pp. 14–19.

10. JCI - Environmental exposures and mechanisms in allergy and asthma development (no date). Available at: https://www.jci.org/articles/view/124612 (Accessed: 31 October 2020).

11. Y. Jin, *et al.* (2017) 'Effects of environmental pollutants on gut microbiota', *Environmental Pollution*, 222, pp. 1–9. doi: 10.1016/j.envpol.2016.11.045.

12. S. Kumar, *et al* , (2017) 'Water Pollution in India: Its Impact on the Human Health: Causes and Remedies', p. 6.

13. N. Kumari, *et al* (2018) 'Modeling the Dynamics of Infectious Disease Under the Influence of Environmental Pollution', *International Journal of Applied and Computational Mathematics*, 4(3), p. 84. doi: 10.1007/s40819-018-0514-x.

14. K. Lam, *et al.* (2007) 'Proliferating bacterial symbionts on house fly eggs affect oviposition behaviour of adult flies', *Animal Behaviour*, 74(1), pp. 81–92. doi: 10.1016/j.anbehav.2006.11.013.

15. D. I. La Milia, *et al.* (2019) 'Monitoring of Particle Environmental Pollution and Fungal Isolations During Hospital Building-Work Activities in a Hematology Ward', *Mediterranean Journal of Hematology and Infectious Diseases*, 11(1). doi: 10.4084/MJHID.2019.062.

16. P. J. Landrigan, *et al.* (2016) 'Health Consequences of Environmental Exposures: Changing Global Patterns of Exposure and Disease', *Annals of Global Health*, 82(1), pp. 10–19. doi: 10.1016/j.aogh.2016.01.005.

17. C. Lu, *et al.* (2018) 'Early life exposure to environmental pollution increases childhood asthma, allergy and infection', *Chinese Science Bulletin*, 63(10), pp. 954–967. doi: 10.1360/N972017-01346.

18. R. Mehrdad, *et al.* (2008) 'Musculoskeletal disorders among municipal solid waste workers', *Acta Medica Iranica*, pp. 233–238.

19. L. B. Murrison, *et al.* (2019) 'Environmental exposures and mechanisms in allergy and asthma development', *The Journal of Clinical Investigation*, 129(4), pp. 1504–1515. doi: 10.1172/JCI124612.

20. G. U. Nzewuihe, *et al.* (2021) 'A study of knowledge, attitude and practices regarding human activities and the breeding of mosquito vectors of human diseases in Ikeduru L.G.A., IMO state, Nigeria', *Journal of Entomology and Zoology Studies*, p. 9.

21. D. Ae. Okpara, *et al* (2021) 'Proliferation of household waste irregular dumpsites in Niger Delta region (Nigeria): unsustainable public health monitoring and future restitution', *Sustainable Environment Research*, 31(1), pp. 1–10.

22. A.Patz Jonathan *et al.* (2004) 'Unhealthy Landscapes: Policy Recommendations on Land Use Change and Infectious Disease Emergence', *Environmental Health Perspectives*, 112(10), pp. 1092–1098. doi: 10.1289/ehp.6877.

23. A. Prüss-Üstün, *et al.* (2016) *Preventing Disease through Healthy Environments: A Global Assessment of the Burden of Disease from Environmental Risks*. World Health Organization.

24. C. E. Sanderson, *et al* . (2020) 'Unchartered waters: Climate change likely to intensify infectious disease outbreaks causing mass mortality events in marine mammals', *Global Change Biology*, 26(8), pp. 4284–4301. doi: 10.1111/gcb.15163.

25. J. G. Scott, *et al.* (2014) 'Genome of the house fly, Musca domestica L., a global vector of diseases with adaptations to a septic environment', *Genome biology*, 15(10), pp. 1–17.

26. S. Sharma, *et al*, (2019) 'Dynamics of a waterborne pathogen model under the influence of environmental pollution', *Applied Mathematics and Computation*, 346, pp. 219–243. doi: 10.1016/j.amc.2018.10.044.

27. H. Shuval, (2003) 'Estimating the global burden of thalassogenic diseases: human infectious diseases caused by wastewater pollution of the marine environment', *Journal of Water and Health*, 1(2), pp. 53–64. doi: 10.2166/wh.2003.0007.

28. J. H. Spencer, *et al.* (2020) 'Emerging infectious disease, the household built environment characteristics, and urban planning: Evidence on avian influenza in Vietnam', *Landscape and Urban Planning*, 193, p. 103681. doi: 10.1016/j.landurbplan.2019.103681.

29. K. Srivastava, *et al* (2015) 'Role of Environmental factors in Transmission of Tuberculosis', p. 12.

30. N. Stroeymeyt, *et al.* (2018) 'Social network plasticity decreases disease transmission in a eusocial insect', *Science*, 362(6417), pp. 941–945.

31. Y. Suleman, *et al*. (2015) 'Solid waste disposal and community health implications in Ghana: Evidence from Sawaba, Asokore Mampong municipal assembly', *J Civil Environ Eng*, 5(6).

32. A. Suk William, *et al.* (2016) 'Environmental Pollution: An Under-recognized Threat to Children's Health, Especially in Low- and Middle-Income Countries', *Environmental Health Perspectives*, 124(3), pp. A41–A45. doi: 10.1289/ehp.1510517.

33. Y. Sun, *et al.* (2020) 'Associated Effects and Efficiency Evaluation between Wastewater Pollution and Water Disease Based on the Dynamic Two-Stage DEA Model', *Healthcare*, 8(3), p. 279. doi: 10.3390/healthcare8030279.

34. A. S. Thomas. (2020) 'air pollution and nutritional transition as risk factors for non-communicable diseases : the emerging trends in health scenario of kerala, india', p. 5.

35. H.-J. Tsai, *et al.* (2021) 'Environmental Pollution and Chronic Kidney Disease', *International Journal of Medical Sciences*, 18(5), pp. 1121–1129. doi: 10.7150/ijms.51594.

36. S. Whittaker, *et al.* (2018) 'Air Pollution and Infectious Disease Burdens on Lung Function in the Eastern Caribbean', *ISEE Conference Abstracts*. doi: 10.1289/isesisee.2018.O04.01.14.

37. X. Xu, *et al.* (2018) 'Environmental pollution and kidney diseases', *Nature Reviews Nephrology*, 14(5), pp. 313–324. doi: 10.1038/nrneph.2018.11.