

## HOSPITAL WASTES CAUSES AIR POLLUTION, CASE STUDY OF HOSPITAL WASTES DISPOSING PROCESS IN PESHAWAR CITY

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### Abstract

Air pollution is one of the challenging issues for the progressing world in recent decades. In revolution of development all countries are in the race of achieving economic growth without considering the environmental threats as major issues. Sustainable development Goal 3, Good health and well-being is strongly correlated with goal 15, Life on land. Sustainable life on this planet can be achieved by utilizing all natural resources in a way such that it cannot disturb the environment for future generation. Clean and fresh air is a natural gift, but it has been observed from the past few decades that the quality of fresh air is worsen off due to many factors like carbon emission from industrial sector, Transportation, open burning of waste, etc. Pakistan has been ranked in the top countries that are vulnerable to climate risk and cities with high air quality index. Each year almost 128,000 people in Pakistan died due to air pollution. This study evaluates the disposing process of different hospitals waste in Peshawar city. 10 tertiary level hospitals and 6 laboratories were taken in sample size based on simple random sampling. The focal person of waste management system in each hospital was interviewed regarding the processes of handling hospital wastes. Results show that 62 percent of the hospitals were not following the general SOP's of health department and rules of Environmental protection agency. 38 percent of the hospital waste management (HWM) team was not aware from the negative impact of sharp waste and 62 percent were not considering hospital waste as a serious issue. Study concludes that there is a need of proper mechanism for the treatment of the hospital sharp waste. The waste disposal plant with high potential incinerators are much costly, to divide the cost burden all the private hospitals should collectively establish waste disposal plant outside the city monitored by KP environmental protection agency to regulated the standard operating procedures (SOP's).

**Keywords:** Air Pollution, Hospital Wastes, Air Quality

### INTRODUCTION

Under developing countries have major problems of environmental externalities like land and air pollution that increasing greatly with the passage of time. Variation of solid waste, land pollution and air pollution is the function of many factors like increase in population density, types of businesses, industries, culture and implementation of laws and rules. (Ayse Cebe, 2013). In 1992 for the solution of these issues, Agenda 21 was adopted in the United Nations

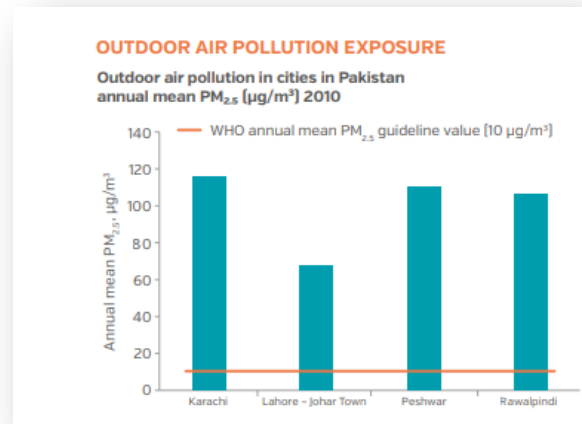
meeting on environmental and development (UNCED) in Rio de Janeiro that specify goals and targets regarding to waste management. According to that conference all countries around the world must have to establish disposal criteria, waste treatment and monitoring for the environmental impact of waste by the year 2000. And by 2025, all countries have to ensure that they dispose all of their waste, sewage and wastewater according to the guidelines of international quality standard (Akter, 2000).

Pakistan is a rapidly developing lower income country in south Asia that depends on the agriculture activities and mostly vulnerable to climate change. According to the World Bank data Pakistan is on 12th position of those countries that are most adversely affected by the climate change. Statistics at different reports shows that 5.2 million people with four million children die every year due to waste borne diseases. Air pollution is one of the major problem and a largest health risk that causes seven million deaths each year. On global level carbon emission has increased up to 80 percent from 1970 to 2010. Currently Pakistan is contributing 407 ppm carbon emission annually that becomes approximately 0.7 percent of the total global carbon emission. Causes of air pollution are moment of vehicles, emissions from industries, and electricity generation from coal, household cooking and burning of waste dumping sites (WHO, Climate and health Country Profile, 2015).

Many of social and environmental problems are increasing with time in congested big cities like Peshawar where more population density is found. One of the main problems in Peshawar city is air quality, a cause of many diseases. Because of many economics activities inside a Peshawar city like carbon emissions from industries, automobiles movement and burning of waste reached the air quality index above than 100 on averages. According to the world health organization for a healthy environment Air Quality Index (AQI) should be below than 100.

Here is a graph showing outdoor air pollution of different cities of Pakistan. These are the most populated cities for which there was air pollution data available and it has annual mean PM<sub>2.5</sub> levels that were above the WHO

guideline value of 10µg/m<sup>3</sup>.



**Figure 1: Outdoor Air Pollution Exposure**

**Source: Ambient Air Pollution Database \_WHO (May, 2014).**

One of the key factors of the air quality issue is burning solid waste, especially waste of hospital and laboratories without disposing it through the use of incinerators in hospitals and laboratories of Peshawar. Out of the total amount waste generated by health services, 80 to 85 percent are not harmful but the remaining 20-15 percent is considered harmful for human and environment and it is the second hazardous waste after radioactive waste (WHO, Health-care Waste, 2018).

Burning of hospitals waste causes environmental problems and diseases like asthma, tuberculosis, severe allergy and lung diseases. Study held in last year mentioned that still teaching level hospitals like Khyber Teaching Hospital (KTH) have burning chamber to burn the hospital waste and do not use incinerators that conclude that waste management teams at hospital are not following SOP for the treatment of waste disposing (Dawn, 2017). And most of the hospitals waste is burn near ring

road dumping side that causes a huge trouble for the society over there (yousafzai, 2017). Hospital waste is classified into many types as most of the waste composed of human body parts, biopsy materials and tissues etc. and it's called a pathological waste but this study is concern with non degradable waste like all types of needles, drips, IV tubing, syringes, scalpels blades, strips etc. and such waste are called sharps waste.

From census 2017, total population of the city is 1.97 million and also for treatment of major diseases people from all over the province try to reach the capital city for best health services that shows consumption of health services on large scale. There are approximately 72 public and private hospitals, medical centers and many laboratories in Peshawar city (Government, 2018). Most of these hospital and laboratories (both public & private) do not properly following standard operating procedure (SOP) for the disposing of waste issued by government of Pakistan. According to the Khyber Pakhtunkhwa Environmental Protection Act -2014, section 17 discharge or emission of any air pollution, noise pollution, waste and handling of hazardous substance, or any other act that violate the act, rules and regulation that effect Khyber Pakhtunkhwa environmental Quality standard will be punished and fined. The punishment and penalties were mentioned in section 18th (KPK, 2014).

From environmental perspective land, water and air pollution that is hazardous for environment and human health should be treat, dispose through proper channel. Specifically the study targets the problem of burning behavior of solid hospital waste in capital city of Khyber Pakhtunkhwa.

## **PROBLEM STATEMENT**

This study identifies either public or private hospitals and laborites are using a proper method for the disposal of hospital wastes or they are burning it openly that disturb the environment nearby. And how to solve the issue that is causes problems not only for the current population and environment but also for the future generation.

## **STUDY OBJECTIVES**

The focus objectives of this study were

1. To check the Medical inorganic hospital waste management (HWM) system in different hospitals and laboratories, knowing about expert opinion on problem.
2. Reasons for non-implementation of government rules and standard operating procedure (SOP's). And to aware the medical waste staff from environmental perspective.

## **LITERATURE REVIEWE**

The solid clinical waste generate during the treatment in hospitals. 90 percent of the waste generated can be decomposed during the processes that are not harmful to human health. The remaining 10 percent is risky waste, harmful, infectious, transfusion and transmitted for the human because it causes diseases like hepatitis (A, B & C) and it is also hazardous for the environment surrounding. It is very important to be a committee working for medical waste and make a proper medical waste control plan. Waste control plan will help in minimization of hazardous waste by storing it for a very short time period and disposing waste permanently. Besides all precautionary

steps there is also a need of awareness among hospital lower staff and public to dispose waste properly and try to save environment (Ayse Cebe, 2013).

Article criticizes the handling of biomedical sludge in the Accra metro area in Ghana. Using qualitative method of collecting data by conducting interviews, marketing study and observation techniques, a condition of instability was found that specify the control of biomedical sludge in the region which was risky for the people's health and environment. There was no such system of incineration and proper sanitary landfill in the region and the survey of health care facilities revealed lack of access to such technologies. As a result, unrefined burning and unsystematic dumping of contagious and poisonous remainder was found. This unrefined burning of toxic biomedical sludge cause cancerous substances which include (PAH's), (PCDF's), lead, hydrogen, mercury, cholobenzene etc. This study concluded that there is need for effectual and enforceable law for biomedical sludge at the local level and mandated care of biomedical sludge in entire health care facilities (Squire, 2013).

Investigate the issues related to the environment and management of hospital decay including their practices and right to obey the regulations. Majority of states especially developed states faces the problem of environmental pollution such as pathological debris which arises from dense population and increased growth in hospitals. Few researches in India have confirmed that hospital dispensaries, medical shop didn't control health care waste appropriately. So the main objective of this study is to examine the control of health care waste. The paper suggested different methods to treat the hospital

waste which include Incineration, Auto clave treatment, Hydro clave treatment, and microwave treatment but hospitals do not use legal methods to reduce such pollution (Mohankumar, 2011).

In developing countries poor clinical waste management and treatment and disposing methods are used that is a serious threat to environment and public health. This study targets the disposing issue in Cameroon. This exploratory study found respiratory, skin infections and intestinal among adults living nearer to waste disposal location. Health impact assessment HIA was used as a tool for a realistic study in Cameroon. Paper concludes that open burn sites and substandard incinerators were commonly practiced in targeted areas. And only 57.7 percent of the workers have sufficient knowledge about hazardous impact of waste. 37.7 % were not aware about the environmental impact of solid hospital and clinical waste. And 78 % worker at hospital needs a guideline for efficient management of waste (Esbjerg, 2011).

Different ways and methods of handling and disposing procedures of medical and waste management were checked in different countries and also to know the knowledge and awareness among the team members that were directly involved in waste handling and disposing activities. Literature found most of the unsafe methods used for the treatment of the clinical and medical waste. Knowledge among concern individuals were also found insufficient. As hospitals waste have a huge impact on surroundings and human health. There is a dare need of raising awareness and education among health care centers and departments. Developing countries should have adopted the technological methods and techniques

used in developed countries for the treatment of hospitals waste or any hazardous waste (Akter, 2000).

Report work on the environmental effects related health care service sector it need a serious concentration management strategies for health waste. A framework was developed to check the impact of industries on quality of environment. Framework captures a direct impact, downstream impact and upstream impact. And the indirect impact remains constant by service sector activities. And in service sector the healthcare was analyze in unique way because it is more sensitive than any other sector. Paper found number of potential ways for environmental management that includes controlling emissions, prevention of pollution through substitution of alternative health services (Davies, 1999).

Majority of the clinics, hospitals spread hazardous wastes and these hospital wastes hold toxic chemicals and they are treated in improper ways. The study has supervised the guidelines and suggested a safe handling system of hazardous waste in Bangladesh. For this the survey has been conducted on the management of hospital wastes in 38 hospitals and clinics in Mymensingh, Dhaka and Dinajpur. The result exhibits that the entire structure was unsafe and unhygienic, and knowledge about the treatment of such waste was low among the hospitals. Paper concluded that the need for seminars and awareness should be raised and by implementing rules and regulations such disposal system will be controlled (Akhtar, 1998).

## **RESEARCH METHODOLOGY**

### **DATA AND SAMPLING**

Data and information were held through field survey and open ended interview based questionnaire is used for the collection of data of different public and private hospitals and laboratories of Peshawar, to know either they have a proper waste treatment management system or not. Hospitals were classified on basis of ownership, either is a public hospital, private hospital or semi-public hospital and same for the ownership of laboratories. As there is few teaching level of hospitals in Peshawar, the study mainly target teaching hospitals where maximum number of patients are treated and maximum number of solid waste are generated. There are approximately 72 total numbers of hospitals, laboratories and medical care inside a Peshawar city (Government, 2018). Out of these 72 health centers, 16 hospitals and laboratories were taken randomly as a sample. Although interview based study are not one hundred percent unbiased but for a good, unbiased and transparent study we divide all public and private hospital into two categories. One those who are charging low and unable to provide good health services and the other who claim that they are best in providing health care services and in these hospitals patients are relatively highly charge due to cleanliness and maintenance of the environment. This perspective of study will also show the difference between the methods used for the treatment of hospital waste.

## **INTERVIEWS**

Interviews were conducted with the hospital waste management team who were directly involved in hospital waste management system and the focal person or in-charge of the committee. This Study tries to find expert opinion on concern issue. 5 to 7 questions were asked during the interview to know about the methods used by waste management team during disposing solid waste.

## **FINDINGS AND DISCUSSION**

Study interviewed different focal person and head of the waste management team of the both private and public hospital. Mostly the private sector of the hospitals are found with no incinerators and do not follow the SOP rules. Five to seven questions were asked during the interview at 16 hospitals. After interview we found that only 3 tertiary hospitals (HMC, KTH and RMI) have their own incinerators and most important only Hayatabad medical complex (HMC) have incinerator approved by Environmental Protection Agency (EPA). Hayatabad medical complex (HMC), Rehman Medical Institute (RMI) and Khyber teaching hospital (KTH) segregates their waste in Red, Yellow and Blue bins as it's a rule of World Health Organization guidelines that hospitals waste is harmful to health and should be segregated. Red color shows sharp waste that is hazardous and should be treated well. Yellow shows infectious waste and blue color indicate organic or cafeteria waste at hospitals that can easily decomposed in open environment. All above hospitals treat the yellow and Red waste in incinerators. That is a positive side of our study we try to compare the quality of these hospitals and found that some of the private hospitals were in worse

condition in with no cleanliness team, accept northwest hospital and few other. North West hospital (NWH) also treats their waste while having an agreement with Hayatabad Medical complex (HMC) for the treatment of their waste.

On the other side many private hospitals at dabiri garden were found without any proper treatment waste plants and they do not follow Standard operating procedures (SOP's) issues by Ministry of Health. 8 hospitals in survey were found that burn their waste at ring road dumping site while the remaining 4 hospitals and many medical laboratories sell their sharp waste that leads to severe health issues. Below are the questions asked forms the team members or focal person dealing with hospitals waste in different hospitals.

Q.1: How much of sharp solid waste is generated by hospitals or laboratory per month?

We found 3 hospitals generating sharp waste approximately 1500 kilogram per month, 2 hospitals with 30000 kg per month, and remaining 11 hospitals were generating sharp waste from the range of 90 - 42000 kg per month. 4 hospitals (RMI, KTH, HMC and NWH) do segregation process of hospitals waste while the rest treat their wastes in mix form and they can't do segregation process of it.

Below graph shows the percentage wise sharp solid waste generated by these hospitals in units of kilograms.

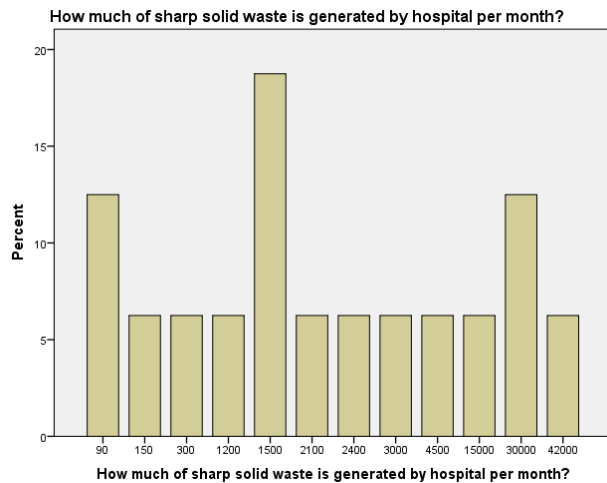


Figure: 2 Sharp Solid Wastes

**Q.2:** Do the hospital/ clinic or laboratory waste management team follow the SOP and EPA rules?

In response of this question we noted that 37.50 percent of the 16 hospitals somehow follow the rules of EPA and standard operating procedures. While 62.50 percent of the hospitals were found that do not follow rules of Environmental protection Agency (EPA). Almost all private hospitals at dabgiri garden were found with no waste management system.

**Q.3:** what are the ways that are used by hospitals or laboratory to treat the solid waste?

Hospitals waste can be treated in different safe and unsafe ways. Response of this question was founded that about 60 percent of the hospitals at dabgiri garden, Peshawar do not treat their solid sharp waste through safe procedures. In this part of study we also came to know that many hospitals and laboratories sell their waste that can be reused for many purposes. Only in private hospitals RMI treat their waste by own incinerator and NW and Amman hospital at dabgiri send their waste to HMC.

**Q.4:** why hospital is not disposing sharp waste through proper channel or the safe procedure to treat hazardous waste?

Public hospital KTH and HMC were disposing their waste under the rules of EPA. And KTH have recently installed new incinerators. While private hospitals were not using safe procedures because of financial problems as the costs of incinerators are very high and its maintenance is difficult. Only Alshaifa health center mention a social problem during interview. Focal person of the Alshaifa health center mention that we were installing incinerator at the roof of hospital but local community does not allow us for this because it creates air pollution.

**Q.5:** Do you (focal person) have enough knowledge related to the hazardous impact of solid waste on environment?

All concern individuals were aware form the medical negative effect of the solid waste but specifically private hospitals at dabgiri garden doesn't take care of environment that shows that there is dare need of awareness among the focal a persons who are directly involve in treatment of waste disposing process.

**Q.6** shows the knowledge of solid waste management team regarding the hazardous impact of solid waste on environment. 38 percent of the hospital's team was aware form the negative impact of sharp waste. And the remaining 62.5 percent of the respondents do not consider it a serious issue.

Does the waste solid management team have enough information about the hazardous impact of solid waste on environment?

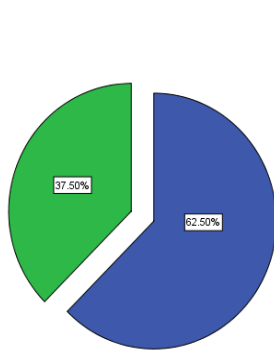


Figure 3: Waste Solid Management

Q.7: What should be done for the concern problem?

When we asked form the concern person at different hospitals about the solution for the problem of disposing waste through unsafe ways than few says it's a responsibility of government to impose rules on hospitals. But some of them give an important opinion about the solution for this problem. Best opinion was to install a waste treatment plant having 2 or 3 incinerators collectively purchased by different private hospitals and it should be monitor by KPK environmental protection agency. Due to air pollution it should not be nearer any community or population. This means that waste disposal plants should be installed outside the city.

#### 5. Conclusion and recommendation

This study tries finding the reason of not implementation of environmental protection agency rules and regulation and how to reduce the burning process of hospital waste. Most of the private hospitals respondents say that they have financial issues because incinerators are too expensive they it need proper maintenance. We also discover that some of the hospitals sell their plastic waste and without proper treatment factories use that waste in

different products. That eye opening truth shows us that there is a need of awareness among the waste management teams in different private hospitals and laboratories.

The study conclude that there is a need dare of proper mechanism for the treatment of hospitals sharp waste. Looking to the issue we find best possible expert opinions for the concern problem.

If different private and public hospitals having no incinerators, collectively in group purchase 2 or 3 incinerators and treat their waste collectively it will solve the whole problems but incinerators plant location should be chosen by KPK environmental protection agency and that also incinerators plant should be under the supervision KPK- EPA.

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