

# Challenges of Healthcare Waste Management in the Gaza Strip, Palestine as a Case Study

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## INTRODUCTION

The major threat of waste management in the Gaza Strip came from the mixture of hazardous and untreated healthcare wastes (HCW) with mainstream domestic solid waste without any prior separation or treatment. Previous report found that only one-third of the healthcare facilities used special bags for HCW collection in the Gaza Strip, whereas all other facilities consequently collected all types of HCW together with domestic waste, except for sharps (El-Hamouz 2010). Municipalities and Joint Service Councils are the responsible parties to collect wastes from designated health centers without any distinction between HCW and domestic waste, and eventually all types of waste are transported in the same vehicle. The report stated that 70% of the collected HCW in Gaza were incinerated using small-scale incinerators, while 20% were burnt in the open air, frequently in waste bins. And the remaining collected HCW invariably ended up in municipal waste dumpsites with all associated environmental and public health risks specifically for waste collectors, and informal waste pickers. In Gaza, numerous people are involved in waste recycling specifically for plastics. A report estimated the total plastic recycling in Gaza in 2010 to be around 10,000 tons per year which corresponds to 20% of the total generated plastic waste flow (UNDP 2012). Thus, mixing HCW with municipal wastes poses serious health threats and burdens the recovery of recyclables. It is then urgently necessary for an effective hazardous and HCW management systems in Gaza for material recovery. A new strategy was initiated in 2016 as a pilot project to support the onsite and offsite management of HCW in South and Middle Gaza in terms of separating the wastes into 3 categories: sharps, infectious, and noninfectious. This study assesses the program in terms of segregation of wastes at source to identify future challenges for 3Rs and material recovery in the Gaza Strip.

## MATERIALS AND METHODS

The study applied direct measurements, and site observation for the purpose to analyze the amount of waste generated, to ensure the accuracy of separation of infectious waste at the source. 13 clinics of United Nations Relief and Works Agency for Palestine Refugees in the Near East (UNRWA) and 27 Ministry of Health clinics (MOH) in the South and Middle Gaza were assessed.

## **RESULTS AND DISCUSSION**

Results showed that the average generation from UNRWA clinics is 72.3 kg month<sup>-1</sup>, approximately 2.4 kg day<sup>-1</sup>. Based on the data collected from the number of outpatients in each clinic from February 2019 to December 2019 from both MOH and UNRWA clinics, analysis using MS-Excel showed that the average generation of sharps and infectious waste from target UNRWA clinics is 11.0 g per outpatient. While for MOH clinics, the actual measured data indicated that the average generation amount of sharps and infectious waste is approximately 19.6 kg month<sup>-1</sup>, which is about 0.7 kg day<sup>-1</sup>. Based on the data collected on the outpatient numbers, the average generation of sharps and infectious waste of target MOH clinics was 9.5 g per outpatient.

A questionnaire survey for hospital workers was performed in July 2019 to grasp the information on awareness at the level of on-site management process. It was observed that out of a total of 37 places of waste generation, 31 (84%) had all three-colour coded bins and all places had the right boxes to dispose of sharps. However, 6 (16%) places did not have coloured bins of red, yellow, or black plastic bags. 27 (73%) places segregated sharps, infectious and noninfectious wastes in the right place, and 29 (78%) used appropriate color-coded bags to segregate the wastes at generation sources. In most medical organizations, coloured bins were placed properly, and the majority of the HCW handlers were aware of the hazards of waste handling.

## **CONCLUSION**

This study aimed to assess the effectiveness of the new strategy for proper separation of HCW at source. The measured separated quantities of HCW account for 33% and 54% of the total generated waste from UNRWA and MOH clinics in Gaza, respectively. By applying this new strategy to other health facilities in South and Middle Gaza, 40% of the total generated HCW in the Gaza Strip can be treated properly. And this method, waste segregation at source, will be more efficient in terms of health aspects and material recovery.

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## **REFERENCES**

- El-Hamouz, A., The Development of a National Master Plan for Hazardous Waste Management for the Palestinian National Authority (PNA), 2010.
- MoLG-JICA, Final Report of the Project for Technical Assistance in Solid Waste Management in Palestine, Japan International Cooperation Agency (JICA), 2019.
- UNDP - PAPP assignment to DHV, ENFRA and TECC, Feasibility study and detailed design for solid waste management in the Gaza Strip. Deliverable of the project feasibility study and detailed design for short-term and long-term solid waste management in the Gaza Strip, 2012.