United Nations Development Programme

RAPID ASSESSMENT ON HEALTH CARE WASTE MANAGEMENT IN THE CONTEXT OF COVID-19

ENGINEERS WITHOUT BORDERS USA

Final Report

Engineers Without Borders USA
Submitted to UNDP Istanbul Regional Hub for Europe and the CIS

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1. Introduction

The UNDP Istanbul Regional Office commissioned the Rapid Assessment of the prevailing health care waste systems and legal frameworks and the development of a generic strategy to improve health care waste management (HCWM) in consultation with relevant stakeholders across the globe during the COVID-19 pandemic.

The assessment consisted of deploying surveys to the government, private and public service providers, and health care facilities in seven countries: Ghana, Jordan, Kyrgyzstan, Serbia, Sudan, Panama, and Zimbabwe. The surveys were conducted between the months of July and September 2020.

This report summarizes the findings from this rapid assessment and proposes general recommendations and next steps. Challenges identified by the stakeholders are presented, followed by possible areas of intervention to improve HCWM. Country Reports highlighting specific legal frameworks and issues in each of these countries are attached as **Appendix B**.

The COVID-19 pandemic was declared as a national emergency in most countries during the month of March 2020. The surveyed countries were four to six months into the pandemic during this assessment. In some countries, the HCWM system was already strained before COVID-19. In others, the pandemic caused disruption and stretched the existing capacity.

UNDP appointed Engineers Without Borders USA (EWB-USA) to deliver the project with technical support from independent experts in the field of health care waste.

Lack of data was a major constraint in conducting this exercise, and recommended next steps are outlined in this report to inform national HCWM roadmaps.

2. Background issues in health care waste management (HCWM)

Joint Monitoring Programme for Water Supply, Sanitation and Hygiene (JMP)

The WHO/UNICEF JMP Global Baseline Report 2019 underlines that only 48 countries had sufficient data to estimate coverage of basic waste management services in health care facilities (HCFs); the report authors were thus unable to calculate a global estimate of basic coverage. **Global health care waste management data was lacking prior to the COVID-19 pandemic.**

The JMP uses the following definitions for basic waste management coverage in HCFs:

- **Basic coverage** is defined by the JMP as: "Waste is safely segregated into at least three bins, and sharps and infectious waste are treated and disposed of safely."
- **Limited coverage** is defined as: "There is limited separation and/or treatment and disposal of sharps and infectious waste, but not all requirements for basic service are met."
- **No service:** "There are no separate bins for sharps of infectious waste and sharps/or infectious waste are not treated/disposed of safety."

The available data for the countries that were part of this assessment was the following:

- For **Zimbabwe,** 78% of HCFs had "basic" coverage, and the remaining 22% had "limited" coverage.
- For **Serbia,** 100% of surveyed facilities had basic coverage.
- For **Ghana,** 51% of HCFs had "basic" coverage, and for the rest of those surveyed there wasn't sufficient data to establish coverage.
- For **Sudan, Jordan, Panama and Kyrgyzstan,** 100% of the surveyed facilities did not provide enough data to establish coverage.

3. Project approach and limitations

Desk research

Desk research was performed to obtain available data and documentation regarding the existing HCWM systems in the countries that were part of this assessment.

During the initial desk research related to the COVID-19 pandemic and its consequences, a lack of available data pertaining to quantities of health care waste at the local level was evident. Globally, the most referenced numbers were from Wuhan city, where, according to data cited by the Environmental Protection Department of the Hubei Province, a six-fold increase in daily generation of infectious health care waste was measured in March during COVID-19.

Background information on country demographics and other readily available information was obtained from sources such as the World Bank. The participating countries were also requested to provide information on existing laws, rules and regulations on HCWM.

The World Health Organization (WHO) released various technical guidelines to assist governments and related entities to plan, prepare, coordinate and monitor the country installed response infrastructure and resources, emergency teams, communications, community engagement, surveillance and health and safety of all stakeholders. Additionally, dedicated technical guidelines related to health workers, clinical care, refugee camps and other fragile settings were released to provide information to the related entities for a proper preparedness and response.

The International Solid Waste Association (ISWA) created an online platform called the Response International Knowledge Platform where all countries are invited to share their responses to this crisis, how they are adapting their services, and what extra precautions they are taking to handle waste generated from the COVID-19 pandemic. The platform also houses best practices, webinars, and technical papers prepared by ISWA experts.

Most of the countries developed their own dedicated guidelines and/or standard operational procedures on how to handle health care waste generated due to COVID-19 and guarantee and maintain health and safety conditions/norms for their frontline workers in HCFs.

Listed below is some of the general literature considered during the preparation of this assessment for the proper contextualization of past, present and future HCWM plans, infrastructures, and policies:

1. "WASH in Health Care Facilities: Global Baseline Report 2019" (WHO, UNICEF).
2. "Compendium of Technologies for Treatment / Destruction of Healthcare Waste" (UNEP 2012).
3. "Overview of Technologies for the Treatment of Infectious and Sharp Waste from Health Care Facilities" (WHO 2019).
4. "Managing Infectious Medical Waste during the COVID-19 Pandemic" (Asian Development Bank, 2020).
5. "Safe Management of Wastes from Health-Care Activities, 2nd Edition" (WHO, 2014).
6. "Essential Environmental Health Standards in Health Care" (WHO, 2008).
7. "Status of Health-Care Waste Management in Selected Countries of the Western Pacific Region" (WHO, 2008–2013).

Identifying challenges and improvements in HCWM

Three surveys were conducted with different stakeholders at the level of governmental entities, public or private service providers, and HCFs. (See **Appendix A**). In each of them, major challenges for the HCWM sector were listed and respondents selected those most pertinent to their situations. The proposed HCWM challenges and priority intervention areas are outlined below.

For service providers and governments:

- Funding (inadequate budget available for services, unreliable payment for services from customers, insufficient number of customers)
- Adequate monitoring and supervision of waste services and/or HCFs
- Occupational health and safety (H&S) of staff
- Processing capacity: segregation, storage, treatment and disposal
- Technologies
- Training of customer/client staff (i.e. HCFs)
- Training of own staff
- Public awareness
- Enforcement of government policies/legal framework
- Informal sector/waste pickers
- Investment and resources in the sector

For HCFs:

- Lack of trained staff
- Lack of HCF management and policies on HCWM
- Lack of national policies and standardization on health care waste management
- Lack of infrastructure and assets (i.e. for waste handling, personal protective equipment, segregation, collection and transportation, storage, treatment capacity)
- Occupational health and safety
- Lack of coordination between departments and entities
- Lack of budget for waste management

Respondents had the option to select "None of the above" or "Other" and specify their challenge.

Respondents also identified the major issues within health care waste (HCW) processing according to the following stages:

- Segregation at the source
- Storage capacity
- Transportation and collection capacity
- Treatment capacity
- Disposal capacity

Finally, the surveys included questions to identify major challenges specific to the COVID-19 pandemic:

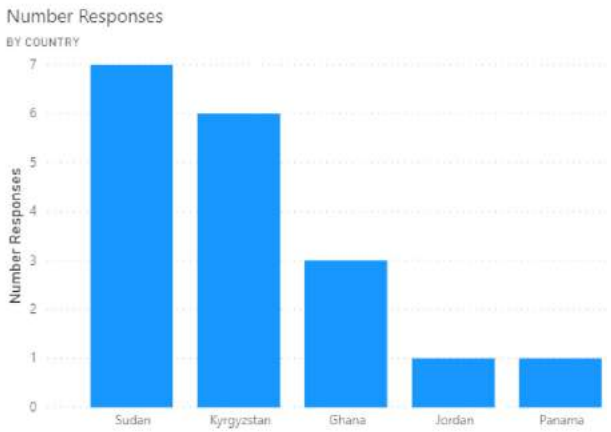
1. HC waste collection, treatment or disposal service disruptions during COVID-19
2. Emergency treatment or disposal procedures in place
3. Frequency of collection of HC waste during the pandemic
4. Evidence of illegal HC waste dumping
5. Training of work crews on safe waste handling during COVID-19
6. H&S concerns during waste handling including: major contamination of infectious waste with non-infectious waste (segregation), bags not properly tied, scarcity of waste containers and plastic bags, lack of personal protective equipment (PPE)

Respondents identified training and capacity building needs and had the opportunity to write in proposals for overall improvements to HCWM in their sector or country. Survey results are included in the HCWM challenges and improvements section in this report.

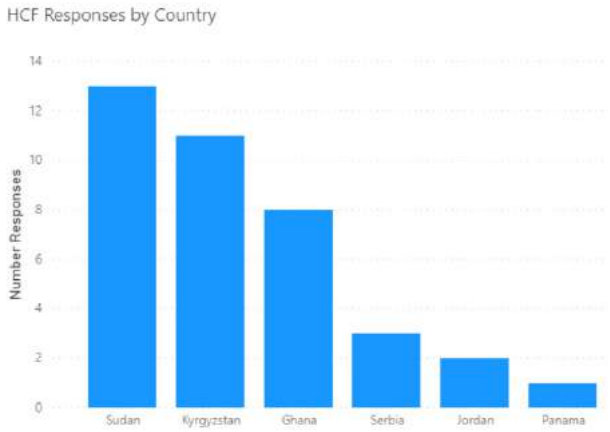
Limitations and survey responses

- This assessment was conducted within a short timeframe during a global COVID-19 pandemic, resulting in low response rate from countries, delays in receiving responses, and limitations in the quality of information received from countries experiencing logistical constraints due to the pandemic.
- The total number of survey responses received for this rapid assessment is 79. A breakdown of responses per country and per survey type is provided in the graphs below. The expected responses were in the range of 150 for seven countries. Although the global average response rate to the surveys was 51%, the bulk of responses came from three countries (Sudan, Kyrgyzstan and Ghana).

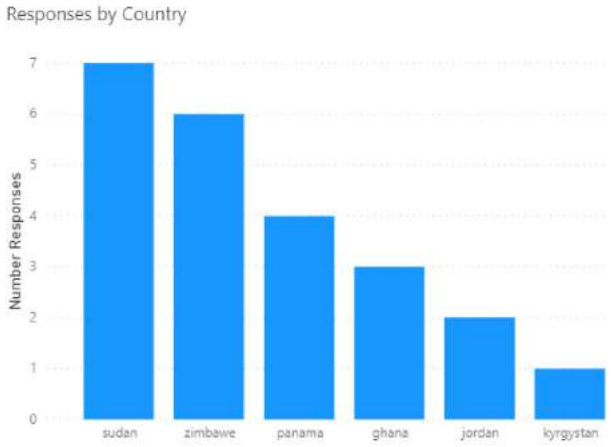
Government responses: **18** (Ghana, Jordan, Kyrgyzstan, Panama and Sudan)



Health care facilities: **38** (Ghana, Jordan, Kyrgyzstan, Panama, Serbia, Sudan)



Public and private service providers: **23** (Ghana, Jordan, Kyrgyzstan, Panama, Sudan, Zimbabwe)



It should be noted that we received no responses from landfill organisations and did not receive information on the management and operation of landfills through this assessment.

4. HCWM challenges and areas for improvement

The following observations stem from the limited data collected during this rapid assessment (79 total survey responses from seven countries).

HCWM as a sector

Institutional and legislative framework

Almost all countries taking part in this rapid assessment have signed the Basel, Stockholm and Minamata Conventions. The only exception is Kyrgyzstan (which has not signed the Minamata Convention).

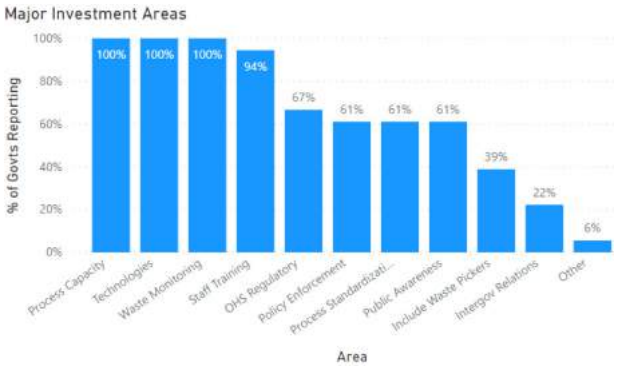
The government institutions in charge of HCWM at the national level are the Ministries of Health and/or the Ministries of Environment.

Most countries do not have separate HCW laws, policies and strategies. The HCW legislation or guidance is found within the hazardous waste sections of the national solid waste, public health or environmental health laws, policies and strategies.

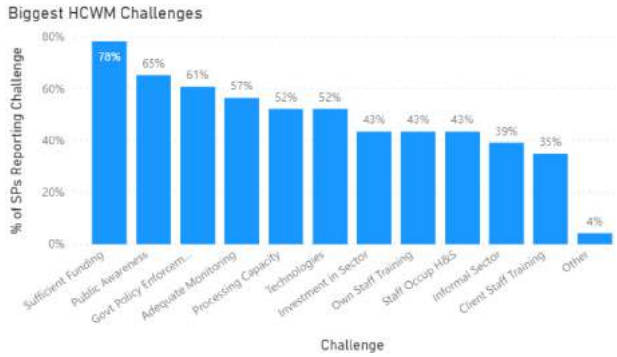
Overall

> ***"Lack of law enforcement and appropriate technology has resulted in 90% of the states burning waste in open dumps that are not engineered"*** — Govt/State response from Sudan

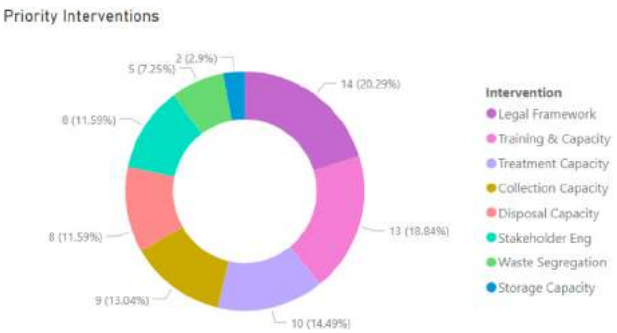
Government respondents from across the globe prioritized these major investment areas: **health care waste processing capacity (storage, collection, transportation, treatment and disposal), technologies, adequate monitoring and supervision of waste services and/or HCFs,** followed by **training of waste and medical staff.**



The following graph shows the percentage of service provider respondents that identified each of the listed challenges. The top challenges reported are **sufficient funding** and **public awareness.**



For service providers, priority interventions are: **improvements to legal frameworks,** and **training and capacity building.**

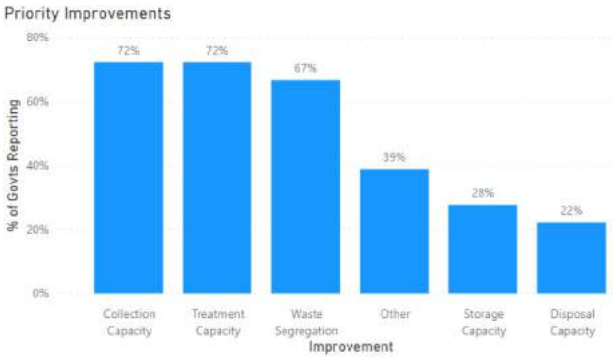


Overall, government and service providers agree that legal frameworks and HC processing capacity need to be improved. Government respondents identified technology as a priority area for investment, whereas service providers prioritized training and public awareness. Sustainable funding to operate and maintain HCWM systems appears to be lacking.

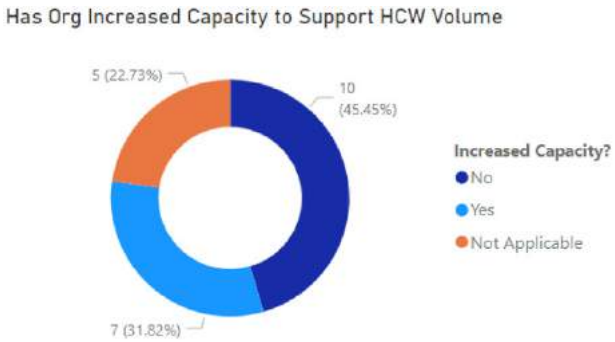
HCWM processing capacity

> ***"The above listed processes [segregation, collection, treatment and disposal] are all relevant in the management of health care waste in my country. Segregation at source is still a challenge in most facilities. This has increased the volume of infectious waste and therefore increased the storage capacity. Most facilities do not have means of collecting and transporting waste for treatment. They use their official pick-ups in government facilities, or the medical superintendent's private car boot in private facilities. They often say they transport the waste for treatment at government facilities with incinerators, but there is no memorandum of understanding to that effect. The available landfill sites are not demarcated. Waste, both treated and untreated, is mixed together, exposing waste pickers to a lot of risk."*** — Government response from Ghana

Government top priority improvements are: **increase collection, transportation, and treatment capacity,** followed by **segregation at the source,** which correspond with major causes of service disruption during COVID-19 as identified in the sections below.



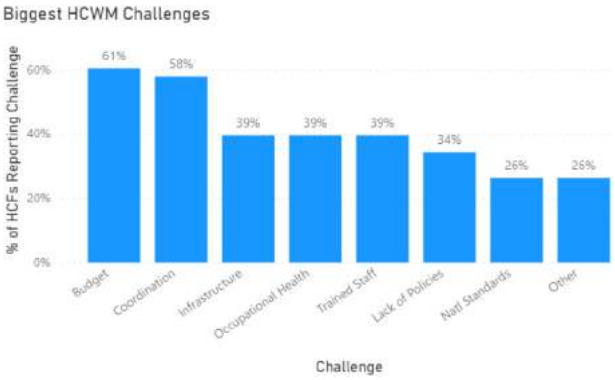
Ten service providers responded that they had not increased their organizational capacity to support an increase in volume of HC waste.



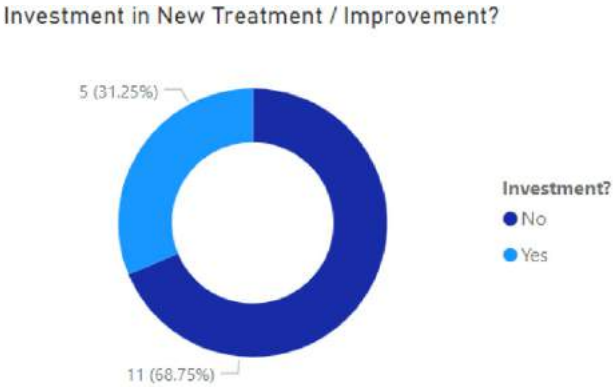
HCWM in health care facilities (HCFs)

Overall

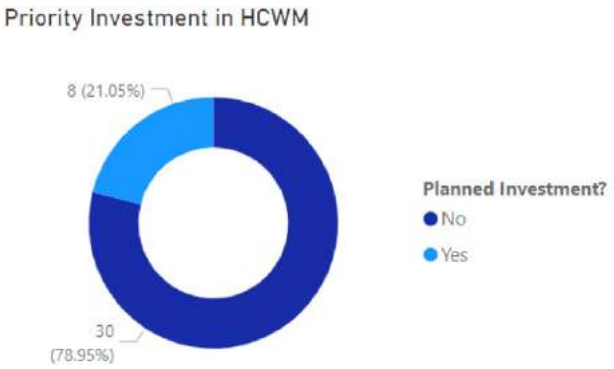
The two most common challenges for HCWM in surveyed HCFs are: **lack of budget for waste management** and **lack of coordination between departments and entities.** The following graph presents the percentage of HCF survey respondents that identified the listed challenges:



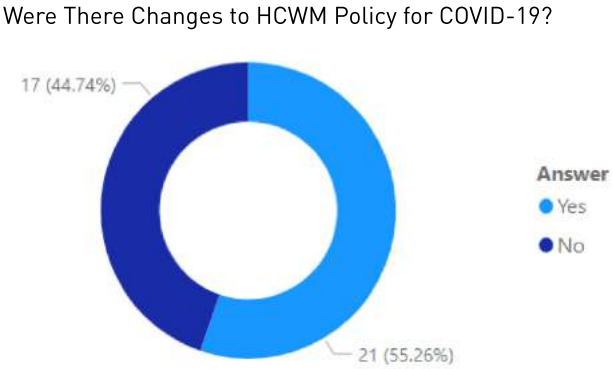
Eleven out of 17 HCFs responded that they were **not investing in new treatment or improvements to existing treatment facilities.** Countries that said they were are: Ghana (3), Jordan (1) and Panama (1).



30 facilities said they had **NO planned investments in HCWM.** Countries that said they did are: Ghana (4), Jordan (2), Kyrgyzstan (1) and Sudan (1).



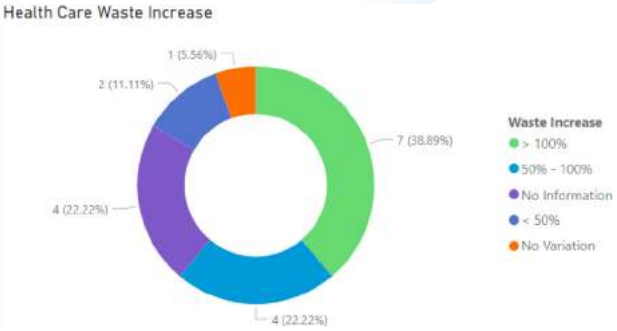
A little over half of HCF respondents reported that **there were changes to HCWM policy during COVID-19.**



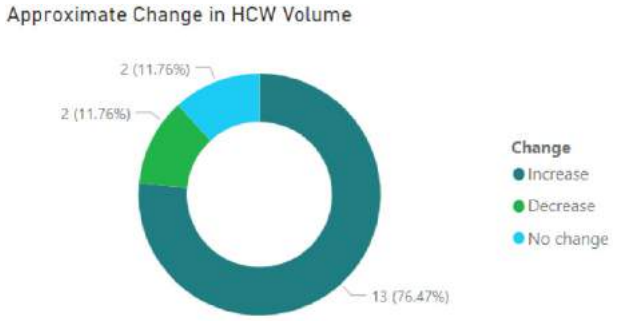
Issues during COVID-19

Health care waste increase or decrease

Nearly 40% of government respondents identified an **increase in HCW of more than 100% during COVID-19** in their respective countries, compared to conditions before the pandemic.



Service providers also identified an **overall increase in HC waste collection** with only four respondents indicating either no change or a decrease in HC waste.



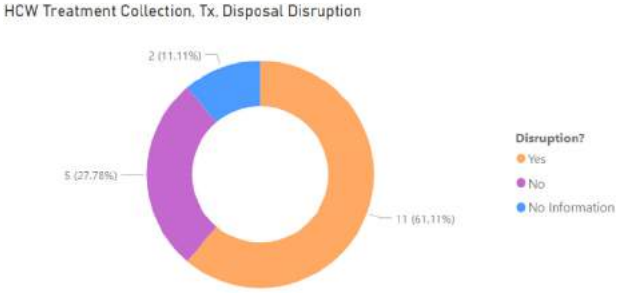
HCFs did not share sufficient data on HCW quantities pre-COVID-19 and during COVID-19. Ghana was the country that provided the most, with almost all of the eight Ghanaian HCFs providing data.

Some HCFs experienced a decrease in overall HCW generation due to fewer patients seeking treatment and others rescheduling or postponing non-emergency procedures.

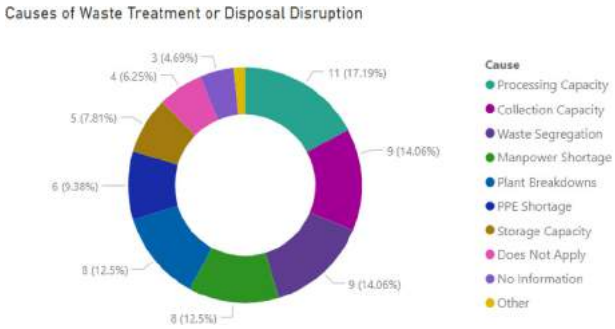
Certain service providers also experienced a decrease in HCW collection and treatment due to losing contracts and clients during the pandemic.

Service disruptions and evidence of illegal dumping

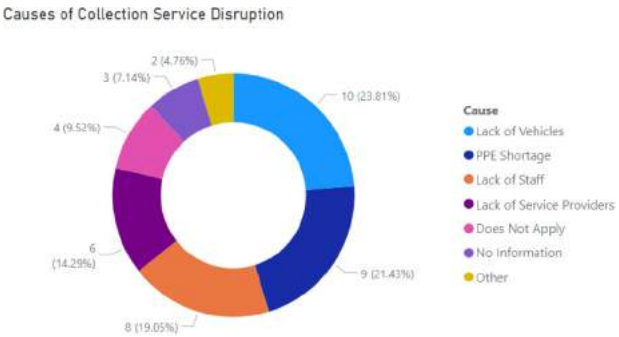
Over half the government respondents reported that there were HCW service disruptions during the COVID-19 pandemic.



The top cited causes for the treatment and disposal disruptions are: **Overall insufficient processing capacity for treatment or disposal, insufficient capacity for collection and transportation,** and **improper segregation of waste at HCFs.**

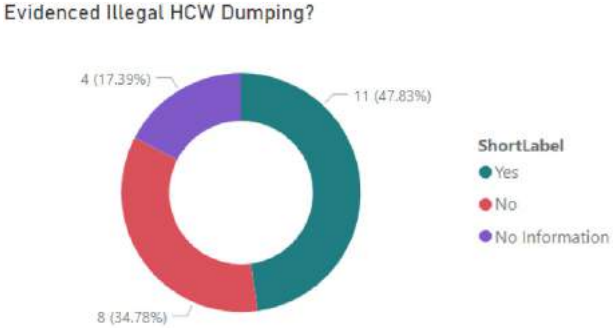


The top cited causes for collection service disruptions were: **lack of availability of transportation vehicles, shortage of PPE** and **lack of staff.**

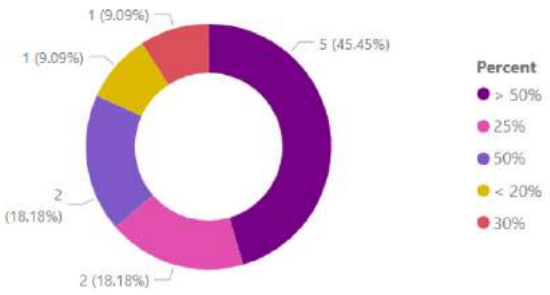


Most of the surveyed service providers **indicated there were no service disruptions in collection** (13/16 respondents) and over half **indicated that there were no service disruptions in disposal of HC waste** (7/11 respondents).

Almost half of service providers **evidenced illegal dumping of HC waste,** and seven out of 11 of these respondents reported **illegal dumping of HCW as equivalent to 50% or more of legal disposal.**



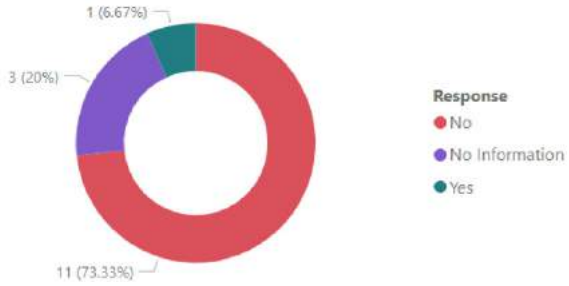
Illegal Dumping as Percent of Legal Dumping



Emergency treatment and disposal

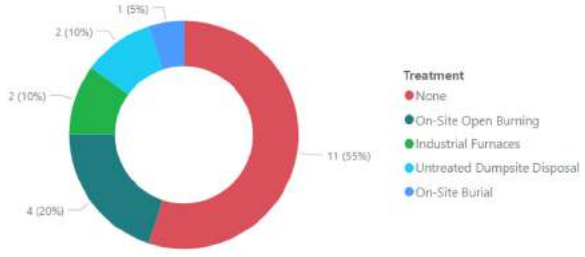
Most service providers indicated that they were **not using emergency health care waste treatment during the pandemic.**

Did Org Open Emergency HCW Tx Sites?



HCFs in Ghana, Kyrgyzstan and Sudan reported that they were using emergency treatment methods. Such methods included: **on-site open burning, use of industrial furnaces, direct disposal (untreated waste),** and **on-site burial.** Most HC facilities responded that they were not using emergency waste treatment methods.

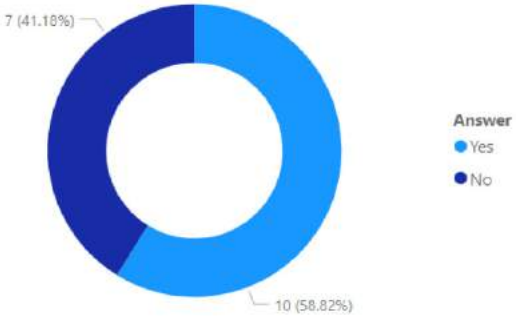
Other Emergency Treatment



Lack of training for work crews

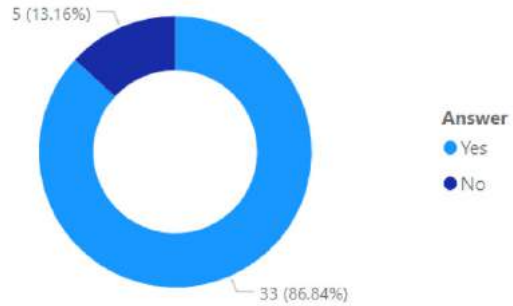
Seven out of 17 government respondents reported that there was no training for waste workers during COVID-19.

HCW Training for Waste Workers for COVID-19?



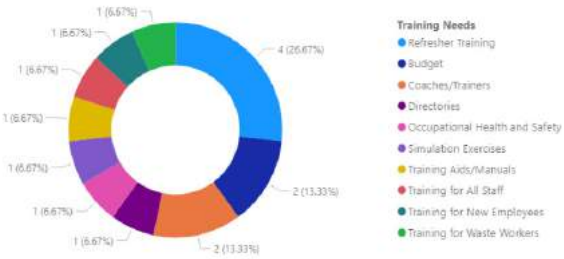
Most HCFs indicated that they **did offer training sessions on HCWM during COVID-19.**

Any Training/Awareness Sessions During COVID-19?



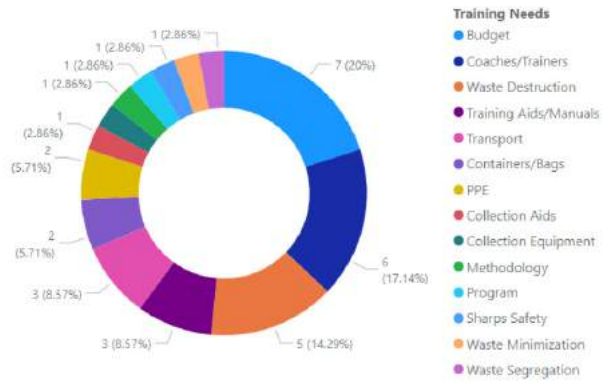
Analyzing the training needs shared by service providers, we see that the most common needs are: **refresher training, budget, and coaches/trainers.**

Training Needs



For HCFs, the training needs expressed are also **budget** and **coaches/trainers.**

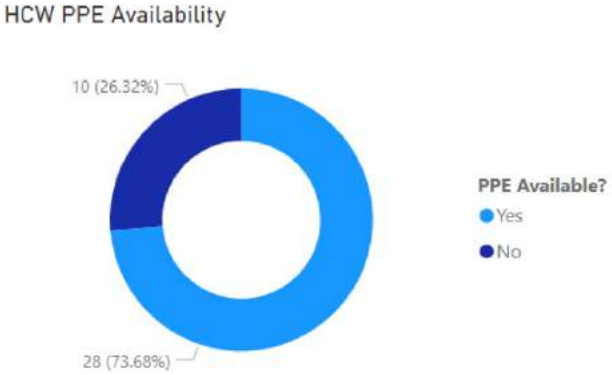
Training Needs



Health and safety (H&S) risks—waste handling

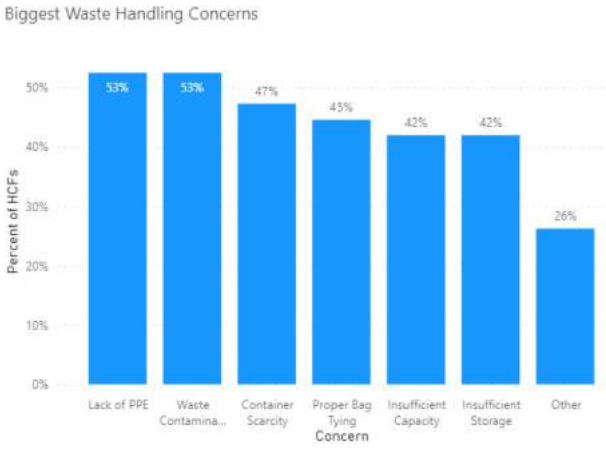
> ***"Thankfully our waste is being treated, but it is disposed of in its original state. This has resulted in waste pickers having access to used PPEs."*** — HCF in Ghana

Most HCFs responded that PPE is available during COVID-19:

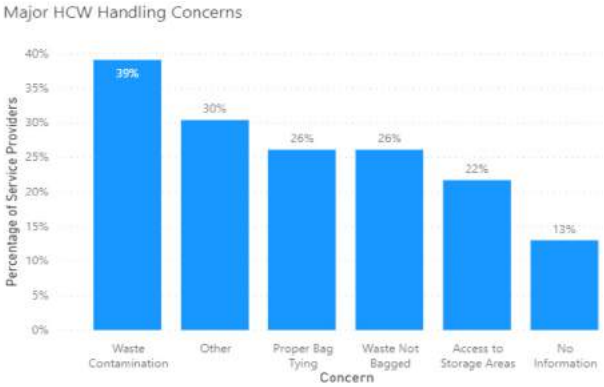


However, this PPE appears to be insufficient, as respondents identified a lack of PPE among major problems in HCWM during the COVID-19 response period:

1. **Lack of PPE**
2. **Major contamination (improper segregation)**
3. **Scarcity of waste containers and plastic bags**



Service providers identified **waste contamination (improperly segregated waste)** as the major concern for waste handlers.



Key feedback from survey responses

> ***"Strategic planning is lacking in waste management at the national level. There are experienced and trained experts in Zimbabwe with international experience, but their impact is constrained by lack of will as well as lack of financial capacity to support them in developing capacity. The medical waste management strategy and legal framework is weak as in all solid waste management."*** — Institute in Zimbabwe

> ***"El estado es muy mal pagador y la banca privada no apoya el sector y eso limita no participar en licitaciones del estado."*** (The state pays poorly and private banks do not support the sector; this limits our participation in state tenders.) — Service Provider in Panama

> ***"There is a risk that consumers will not be able to pay for their services. Many medical device manufacturers use only autoclaving, and do not destroy medical equipment. This sector of the economy is not so attractive for additional investment."*** — Service Provider in Kyrgyzstan

> ***"We have been renting an incineration facility from the general hospital. The amount of waste we collected was greater than the capacity the incinerators can handle. The incinerators were not working up to standard and we had to travel 120km for safe disposal of the waste in a fully functional incinerator. There has also been open fire burning in some facilities in Harare, which presented a severe threat to the community, environment and public health. The situation in Harare could be a ticking time bomb."*** — HCW Service Provider in Zimbabwe

> ***"[There is] limited solid waste management expertise in most organisations, including local authorities."*** — Service Provider in Zimbabwe

5. Trends and analysis

Overall sector challenges

- One of the greatest concerns shared by survey respondents is insufficient funding of this sector, both within and outside of HCFs. Unfortunately, the economic challenges brought on by the pandemic on a global scale may further exacerbate budgetary constraints.
- Lack of training, refresher training, and qualified trainers in HCWM was also a major concern for HCFs and service providers. There is also a lack of, or insufficient, budget for training.
- Improvement of legal frameworks, as well as implementation and monitoring of the existing frameworks, remains a challenge in all countries.
- Respondents identified issues in all steps of HCW processing, starting with improper waste segregation.

COVID-19

This rapid assessment did not provide sufficient data to estimate the HCW generated during COVID-19 in any given country. The overall perception of government respondents is that there was a considerable increase in HCW during the pandemic (with nearly 40% reporting an increase of 100% or more). Most service provider respondents also reported a qualitative increase in HC waste collection, treatment and disposal.

Even with this limited pool of respondents, major issues were identified in HCWM during the pandemic response, such as:

- Illegal HCW dumping
- Service disruptions
- Lack of or insufficient PPE for waste handlers and HCF staff
- Waste cross-contamination (improper segregation and waste handling)
- H&S risks for pickers who have exposure to untreated HCW
- Lack of planned investment in the HC treatment facilities
- Lack of waste increase or decrease scenario planning for emergencies

6. Recommendations and next steps

According to Keith Alverson, Director of the United Nations Environment Programme (UNEP) International Environmental Technology Centre, **"The process of institutionalization of a good health care waste management system is complex. It entails a waste assessment and evaluation of existing practices, evaluation of waste management options, development of a waste management plan, promulgation of institutional policies and guidelines, establishment of a waste management organization, allocation of human and financial resources, implementation of plans according to a set timeline,** as well as a **programme of periodic training, monitoring, evaluation and continuous improvement."**

Each country should have a roadmap to strengthen health care waste management capacity, especially during the pandemic. The recommended steps are:

1. Perform a detailed country waste assessment and evaluation of practices to identify challenges and root causes.
    a. Individual country reports prepared during this rapid assessment present HCWM challenge areas highlighted by survey respondents and past assessments collected during research (see individual country reports in Appendix B), but further assessments are recommended due to the low number of responses and short timeframe of this project.
2. Define the minimum or appropriate level of HCWM to be achieved in the country based on international standards.
3. Identify current national capabilities and capacities to improve by sector. This step can be combined with the detailed country assessment. UNEP has developed a **"National Medical Waste Capacity Assessment Factsheet"** to support governments in this process during the pandemic.
4. Identify strategic HCWM areas, in order of priority, to improve in the medium to long-term timeframe. These improvement areas should

be based on the national capabilities identified in Step 3, and each area should respond to a problem or challenge identified in Step 1. It is important to highlight that sustainable funding for the operations of health care waste facilities needs to be established by governments, as this is often overlooked.

Data from country surveys is limited and does not indicate the needs and preferences of the entire HCWM system, however some common needs emerged and should be considered for implementation at the country level depending on the individual priorities and external factors of each location and system:

1. Development of a comprehensive legal framework on HCWM, including in relevant acts and laws, where not already in place
2. Development of HCWM policies, followed by an implementation plan with clear budget, responsibilities for all parties including international stakeholders, development of guidelines, and facilities-based standard operating procedures
3. Institutionalization of HCWM capacity building into the current training system (i.e. including HCWM modules in the curricula of medical and nursing schools, continuing education for medical professionals, etc.)
4. Creation of awareness raising campaigns to elevate the priority of HCWM from the perspective of the general public and authorities
5. Enforcement of existing legal frameworks
6. Development of a sustainable financing system for HCWM and supporting activities

And, more specifically:

7. Inclusion of waste management parameters in data routinely collected from HCFs. If waste management is not monitored, it will be impossible to improve it at the national level.
8. Aiming to use the most environmentally and climate friendly technologies. Avoiding incineration, especially if using low technology units without air pollution control devices. Establishing recycling of non-hazardous materials, including biodigestion for organics. Setting up central treatment for hard to dispose of wastes, such as chemical and pharmaceutical wastes.
9. Instituting national procurement regulations that consider the waste generated by products procured by the national health care system, for example, by avoiding medical products containing mercury, PVC or chemicals of high level of concern as outlined in the Chemicals of Concern to the Environment Report by UNDP and Health Care Without Harm, or asking suppliers to take back particularly problematic products at end of life.
10. Reducing risk of injuries and transmission of infectious disease by ensuring that sharps and vaccination waste are properly treated (i.e. cutting needles and the tips of syringes off at the point of use will prevent injuries and stop them being illicitly reused).

In addition to setting these medium and long-term priorities, it must be acknowledged that HCWM, especially in response to COVID-19, is an acute problem, and there are many immediate needs identified by stakeholders in this report. The safety of HCWM systems and of the individuals who participate in them depends on response to these immediate needs, as well as planning for longer term response.

Finally, landfill organizations were not reached by this rapid assessment. Their engagement in future assessments is critical as relevant stakeholders in solid waste and informal health care waste management. In general terms, to engage landfill management organizations in HCWM through the pandemic and beyond, it is important to:

1. Define who the landfill management organizations are (public or private entities, cooperatives, unionized, etc.) and their level of influence (i.e. low, medium, high).
2. Understand how they are currently engaging in HCWM.
3. Identify the purpose for which they will be engaged, and which actors would need to engage them.
4. Find the best tools to collaborate with them based on national legislation, regulation and/or practices.

7. References

Author	Date	Name	URL
WHO/ UNICEF JMP	2019	"WASH in HCFs: Global Baseline Report 2019"	https://www.washdata.org/sites/default/files/documents/reports/2019-04/JMP-2019-wash-in-hcf.pdf
Shi Jiangtao and William Zheng	March 5 2020	"Coronavirus: China struggling to deal with mountain of medical waste created by epidemic"	https://www.scmp.com/news/china/society/article/3065049/coronavirus-china-struggling-deal-mountain-medical-waste-created
UNEP	June 2020	"Household medical waste management strategies: COVID-19 Waste Management Factsheet"	https://wedocs.unep.org/bitstream/handle/20.500.11822/32775/FS7.pdf?sequence=1&isAllowed=y
UNEP	June 2020	"National medical waste capacity assessment: COVID-19 Waste Management Factsheet"	https://wedocs.unep.org/bitstream/handle/20.500.11822/32776/FS2.pdf?sequence=1&isAllowed=y
UNEP	June 2020	"How to choose your waste management technology to treat COVID-19 waste: COVID-19 Waste Management Factsheet"	https://wedocs.unep.org/bitstream/handle/20.500.11822/32778/FS3.pdf?sequence=1&isAllowed=y
WHO	Feb 18 2018	"Health Care Waste Factsheet"	https://www.who.int/news-room/fact-sheets/detail/health-care-waste

8. Appendix

A. COVID-19 HCWM rapid assessment surveys

Government survey
Kobo Link: https://ee.kobotoolbox.org/x/Mdp5dkwM
Service provider survey
Kobo Link: https://ee.kobotoolbox.org/x/L5uA70hs
Health care facilities survey
Kobo Link: https://ee.kobotoolbox.org/x/1ZVjZMbM

B. Country reports

Ghana
Jordan
Kyrgyzstan
Panama
Serbia
Sudan
Zimbabwe

www.eurasia.undp.org