



COVID-19 RAPID ASSESSMENT ON HEALTHCARE WASTE MANAGEMENT

Final Report

Engineers Without Borders USA
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1. Introduction

The UNDP Istanbul Regional Office commissioned the Rapid Assessment of the prevailing health care waste systems, legal framework, 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 healthcare facilities in seven countries: Ghana, Jordan, Kyrgyzstan, Serbia, Sudan, Panama, Zimbabwe. The surveying was 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 will be presented followed by the possible areas of interventions 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, this 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 healthcare waste.

Lack of data was a major constraint to conduct this exercise and recommended next steps are outlined in the report to inform a national HCWM road map.

2. Background issues in HCWM

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

As is highlighted in the WHO/UNICEF JMP Global Baseline report from 2019, only 48 countries had sufficient data to estimate coverage of basic waste management services in HCFs therefore they were not able to do 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 safely."

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

- For **Zimbabwe**, 78% of Health Care Facilities (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 surveyed there wasn't sufficient data to establish coverage.
- For **Sudan, Jordan, Panama and Kyrgyzstan** 100% of surveyed facilities didn't provide enough data to establish coverage.

3. Project Approach and Limitations

A. Desk research

Desk research was performed to obtain available data and documentation regarding the existing HCWM systems in these countries.

During the initial desk research related to 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 cited data from the Environmental Protection Department of the Hubei Province, a six-fold increase in daily generation of infectious health care waste was measured in that city 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 of 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 responsiveness.

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

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

Regarding general literature considered for proper contextualization of past, present and future plans/infrastructures and policies related to HCWM Systems, some of the documentation referenced during preparation stages of current COVID-19 Rapid Assessment on Healthcare waste management is listed below:

- (1) WASH in HCFs - Global Baseline Report, JMP (WHO, UNICEF) 2019;
- (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.

B. Identifying Challenges and Improvements in HCWM

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

For service providers and governments:

- Sufficient Funding (budget available for services, unreliable payment for service 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 around Health Care Waste Management
- Lack of National Policies and Standardization Regarding Health Care Waste Management
- Lack of Infrastructure and Assets (i.e. for waste handling, personal protective equipment (PPE), 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 HCW processing according to the following stages:

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

Finally, surveys also 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)

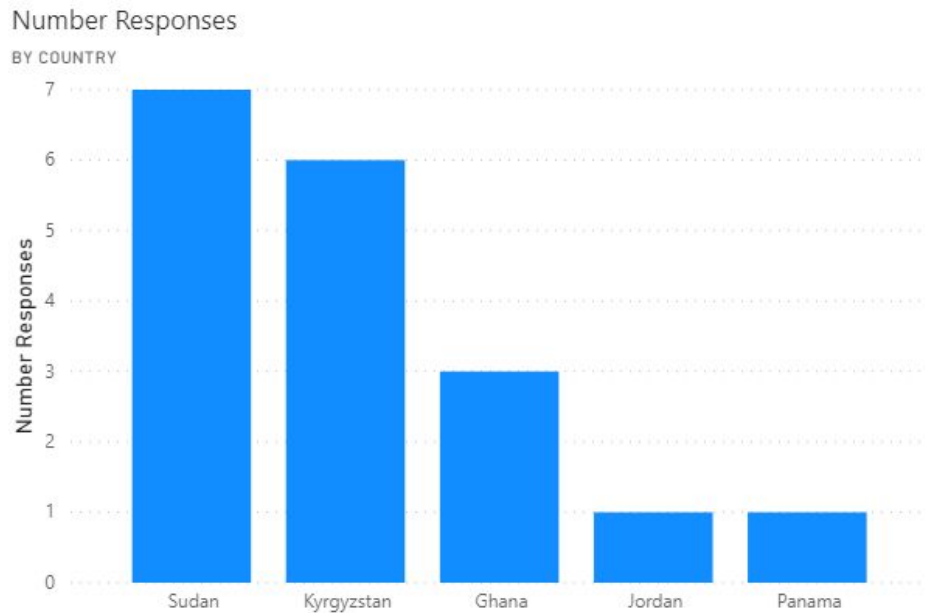
Survey results are included in the HCWM Challenges and Improvement section in this report.

Respondents identified needed training and had the opportunity to write overall improvements that they would consider for HCWM in their sector or country. Survey results are included in the HCWM Challenges and Improvement section in this report.

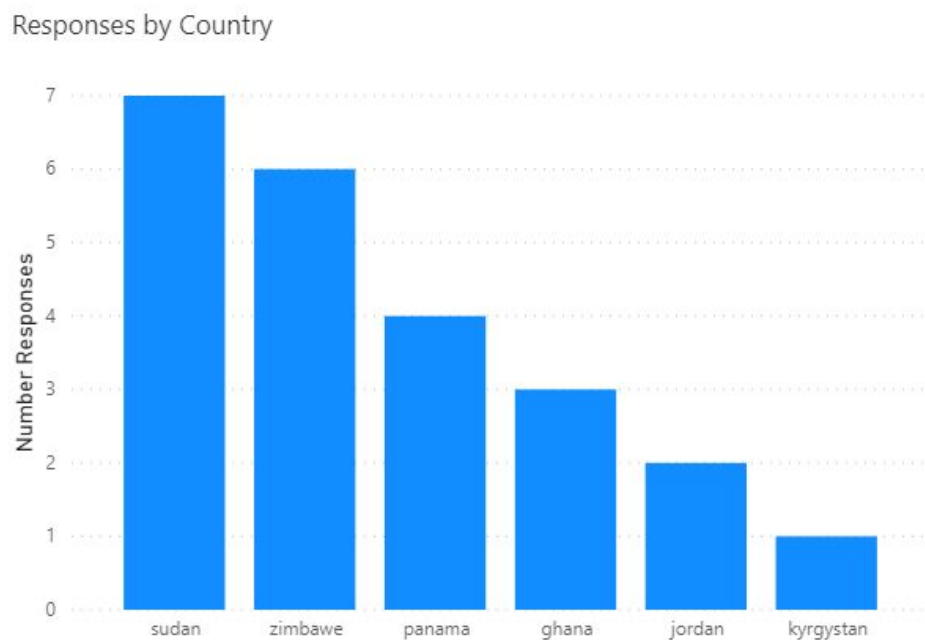
D. Limitations and survey responses

- 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 issues receiving quality information from countries that experienced logistical constraints due to the pandemic.
- The total number of survey responses for this rapid assessment is **79**. A breakdown of responses per country and per survey types are shown in the graphs below. The expected responses were in the range of 150 for 7 Countries. Although the global average response rate to the surveys is 51% , the bulk of the responses come from 3 Countries (Sudan, Kyrgyzstan and Ghana).

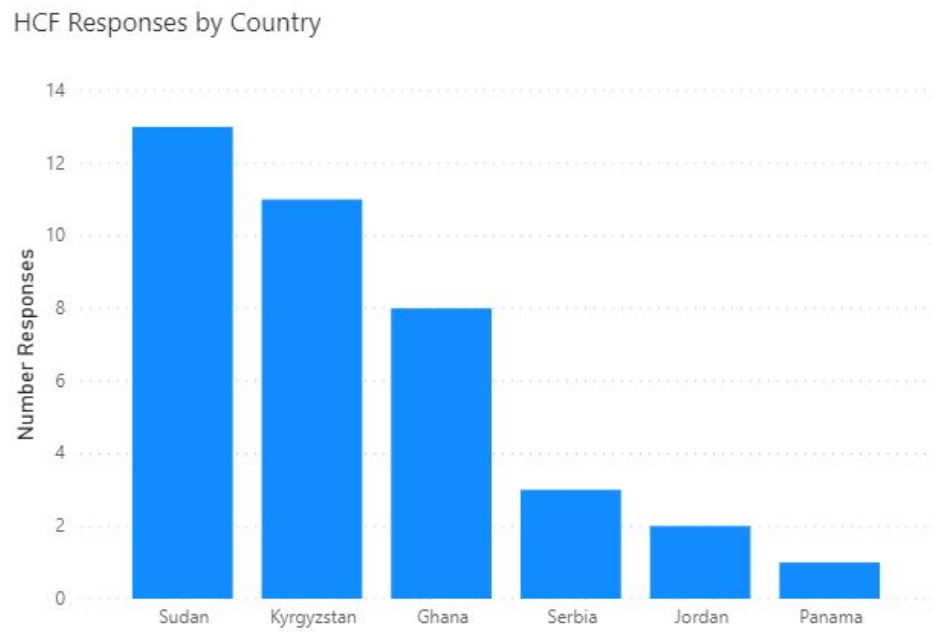
Government Responses: **18** (Ghana, Jordan, Kyrgyzstan, Panama and Sudan)



Public and Private Service Providers: **23** (Ghana, Jordan, Kyrgyzstan, Panama, Sudan, Zimbabwe)



Health Care Facility : **38** (Ghana, Jordan, Kyrgyzstan, Panama, Serbia, Sudan)



- It should be noted that we did not receive any responses from landfill organisations and did not receive information on management and operation of landfills through this assessment.

4. HCWM Challenges and Areas of Improvement

The following data stems from the limited data collected during this rapid assessment. This accounts for 79 total survey responses from 7 countries.

A. HCWM as a sector

a. Institutional and Legislative Framework

Almost all countries part of this rapid assessment have signed the Basel, Stockholm and Minamata Convention. The only exception is Kyrgyzstan (not signed the Minamata convention).

The government institution(s) in charge of HCWM at the national level are the Ministries of Health and/or the Ministries of Environment.

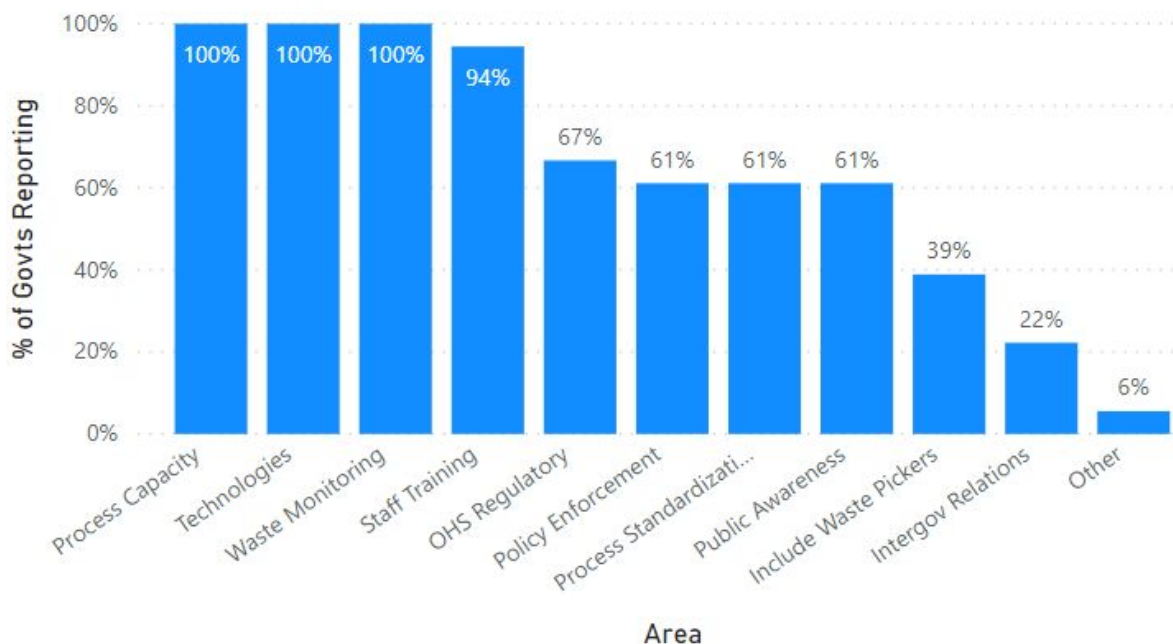
Most countries do not have separate HCW laws, policies and strategies. The HCW legislation or guidance is found within the hazardous waste sections of the national solid waste, public health or environmental health laws, policies and strategies.

b. Overall

"Lack of law enforcement and the presence of appropriate technology have resulted in 90% of the states to burn waste in open dumps that are not engineered" - Govt/State response from Sudan

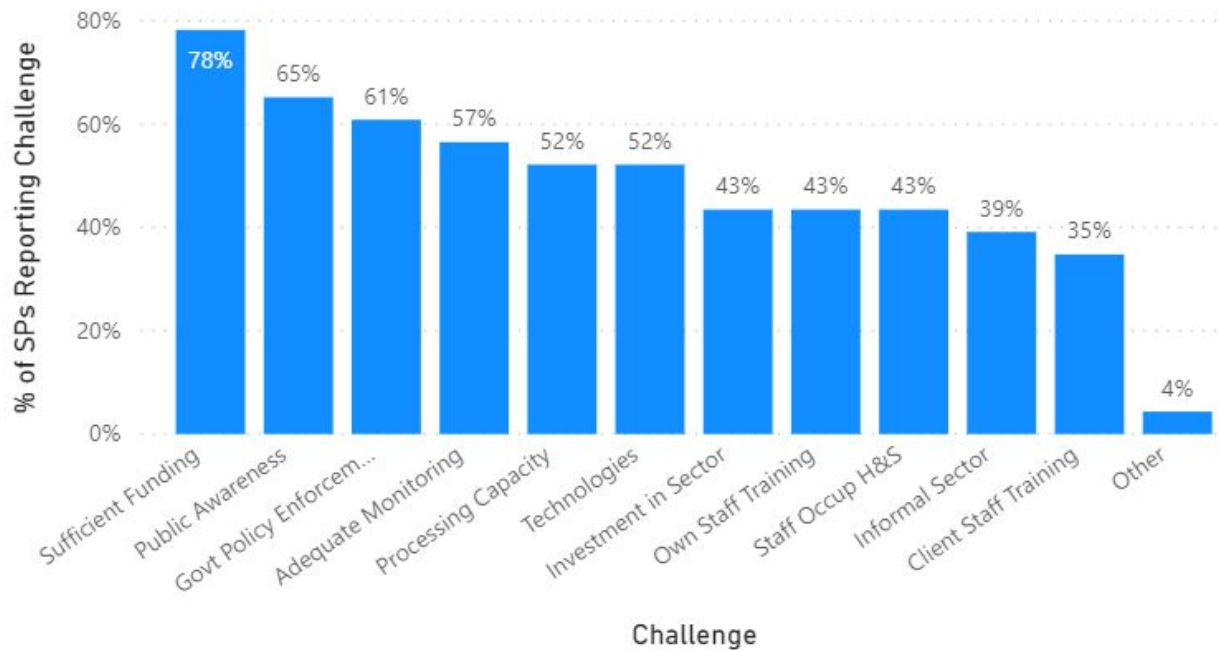
Government respondents from across the globe prioritized these major investment areas: **HCW processing capacity (storage, collection, transportation, treatment and disposal), technologies, adequate monitoring and supervision of waste services and/or HCFs.** Followed by **training of waste and medical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

Major Investment Areas



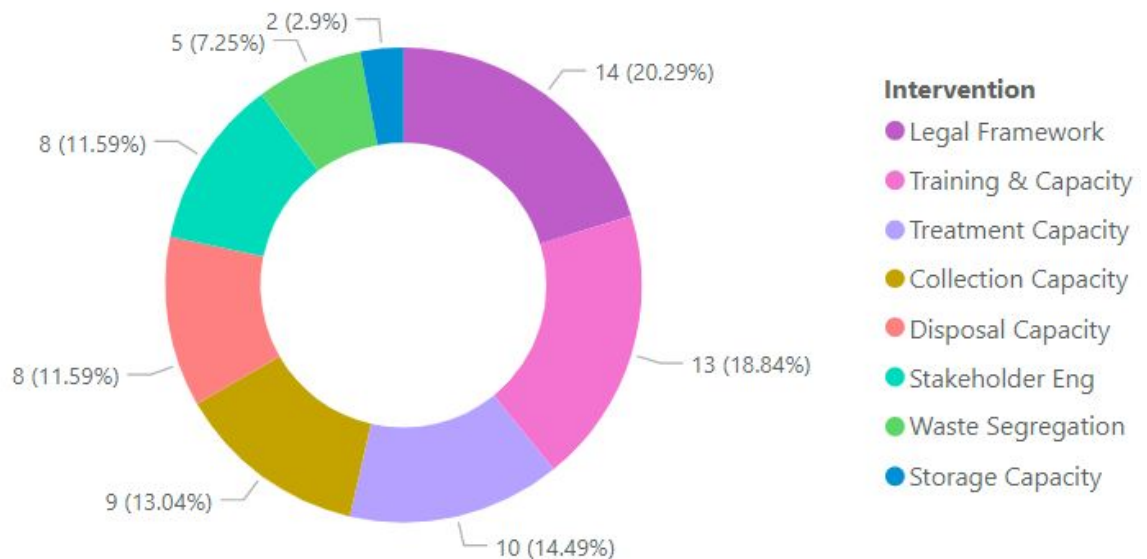
The following graph shows the percentage of service provider respondents that identified the listed challenges. The top challenges reported are **sufficient funding** and **public awareness**:

Biggest HCWM Challenges



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

Priority Interventions



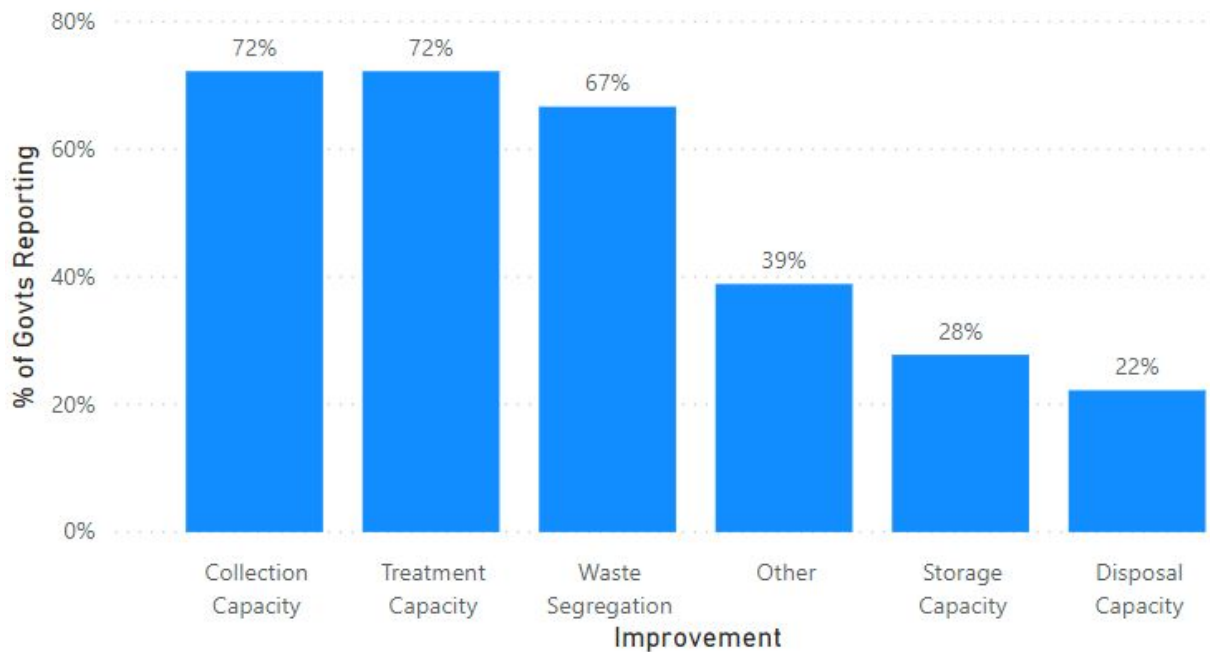
Overall, government and service providers agree that legal framework and HC processing capacity need to be improved. Government respondents identified technology as a major investment area, whereas the service providers prioritized training and public awareness. Sustainable funding to operate and maintain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

B. HCWM processing capacity

“The above listed processes [segregation, collection, treatment and disposal] are all relevant in the management of healthcare waste in my country. Segregation at source is still a challenge in most facilities. This has increased the volumes of infectious waste and therefore increased the storage capacity. Most facilities do not have means of collecting and transporting waste for treatment. They used their official pick-ups in government facilities. Or 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 are mixed together exposing waste pickers to a lot of risk”. - Government response from Ghana

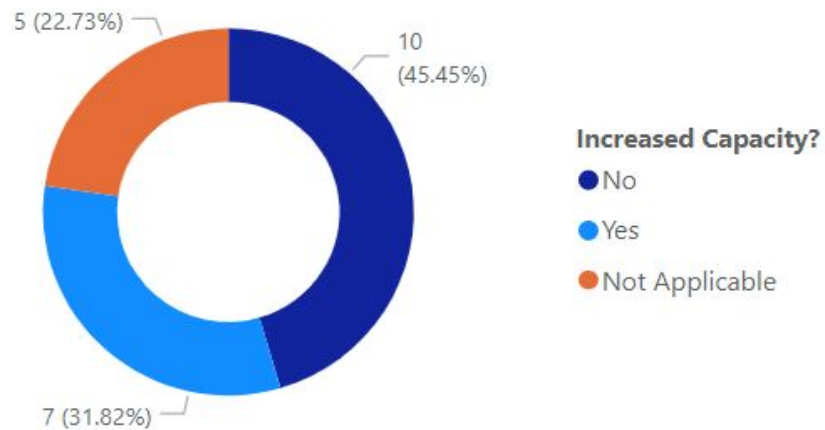
Government top priority improvements are: **Increase collection, transportation and treatment capacity. Followed by segregation at the source**, which align with major causes of service disruption during COVID-19 as listed in the sections below.

Priority Improvements



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

Has Org Increased Capacity to Support HCW Volume

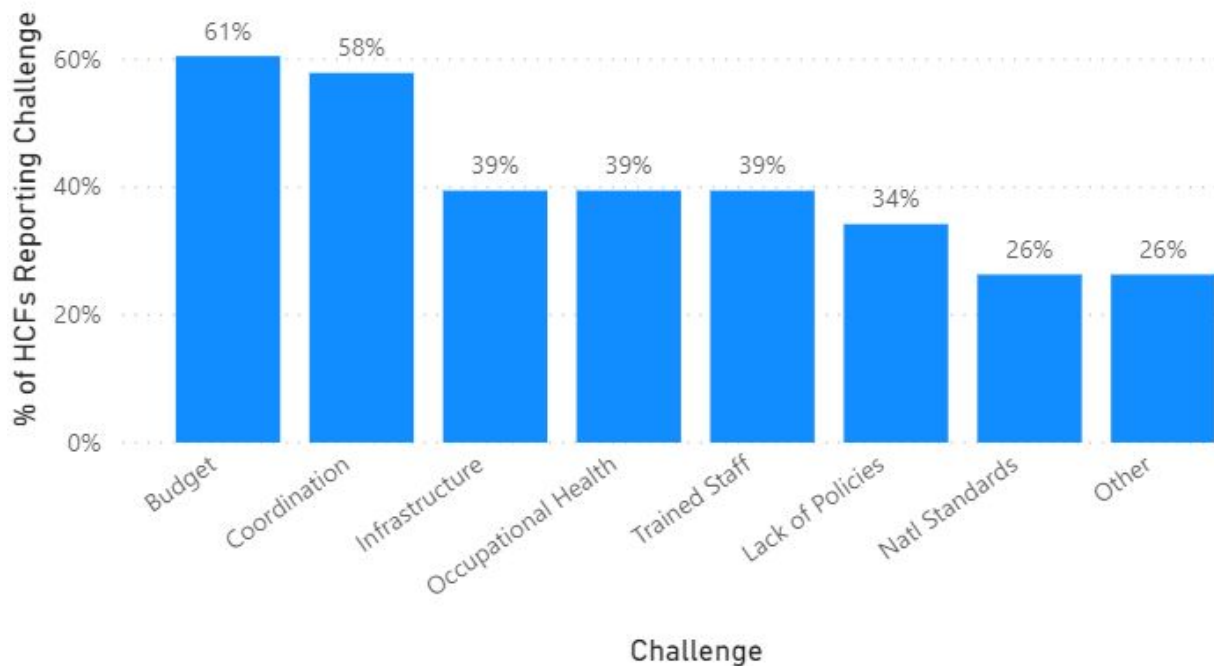


C. HCWM in HCFs

a. Overall

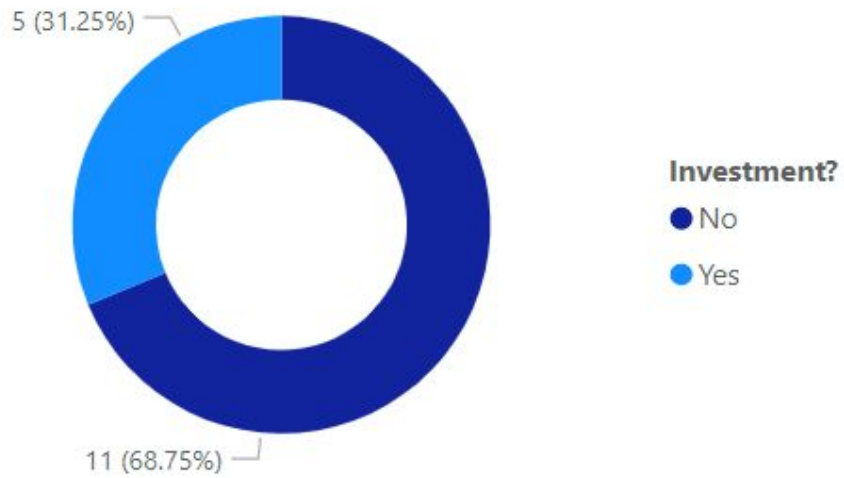
The two most common challenges for HCWM in surveyed HCFs are: **lack of budget for waste management and lack of coordination between departments and entities**. The following graph presents the percentage of HCF survey respondents that identified the listed challenges:

Biggest HCWM Challenges



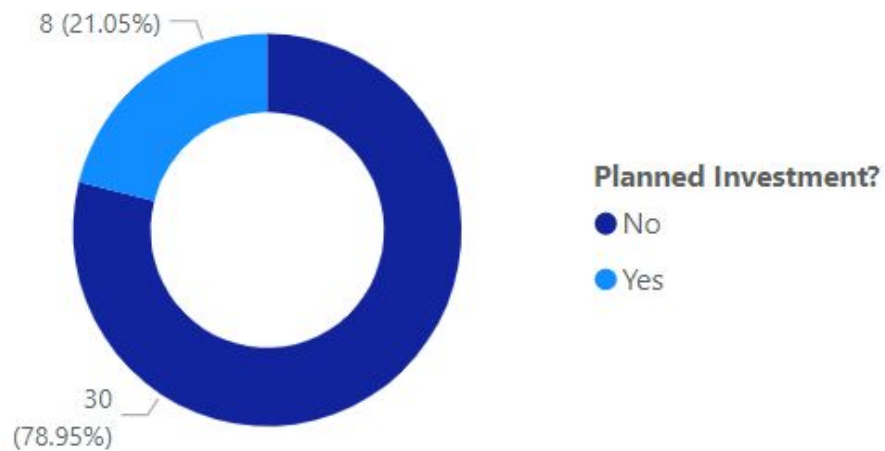
11 out of 17 HCFs responded that they were **not investing in new treatment or improvements to existing treatment facilities**. Countries that answered "Yes" are: Ghana (3), Jordan (1) and Panama (1).

Investment in New Treatment / Improvement?



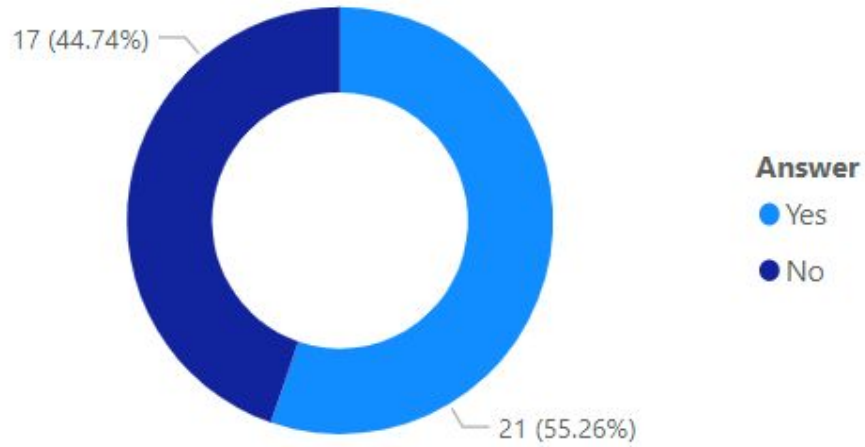
30 facilities said they had **NO planned investments for HCWM**. Countries that answered "Yes" are: Ghana (4), Jordan (2), Kyrgyzstan (1) and Sudan (1).

Priority Investment in HCWM



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

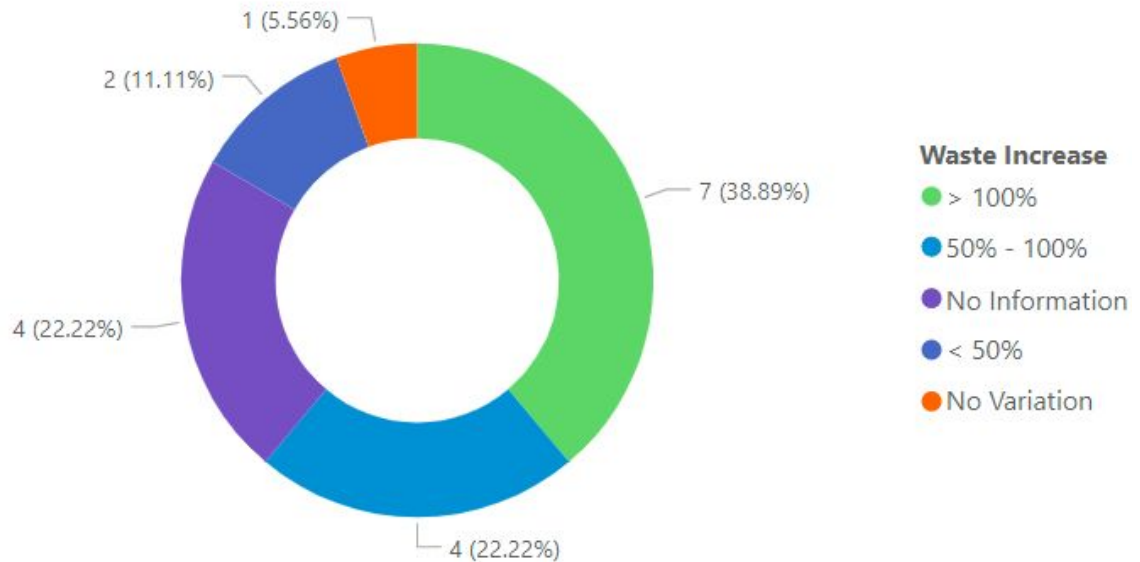
Were there Changes to HCWM Policy for COVID-19?



D. Issues during COVID-19 a. HC waste increase or decrease

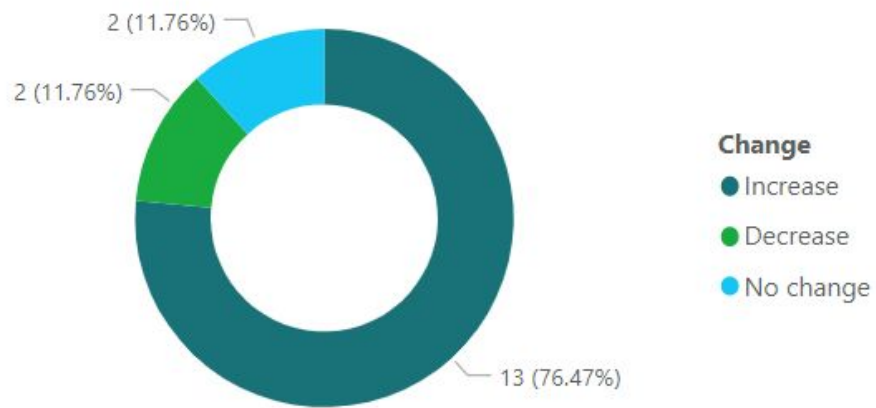
Most government respondents identified an **increase of more than 100% of HCW during COVID-19** in their respective countries compared to conditions before the pandemic.

Health Care Waste Increase



Service providers also identified an **overall increase in HC waste** collection with only 4 respondents indicating either no change or decrease in HC waste.

Approximate Change in HCW Volume



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.

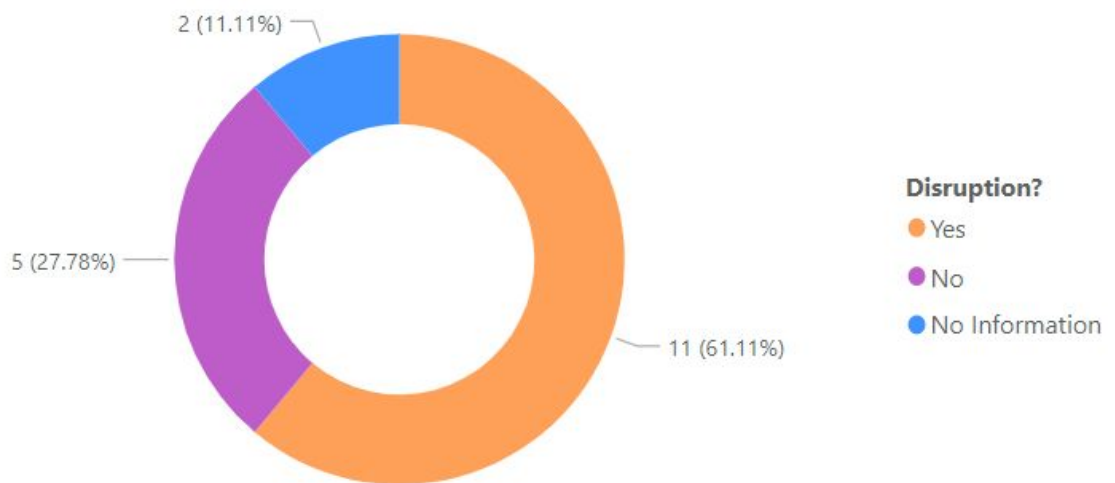
Some HCFs experienced a decrease in overall HCW generation due to fewer patients seeking treatment and rescheduling or postponing non-emergency procedures.

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

b. Service Disruptions & Evidence of Illegal Dumping

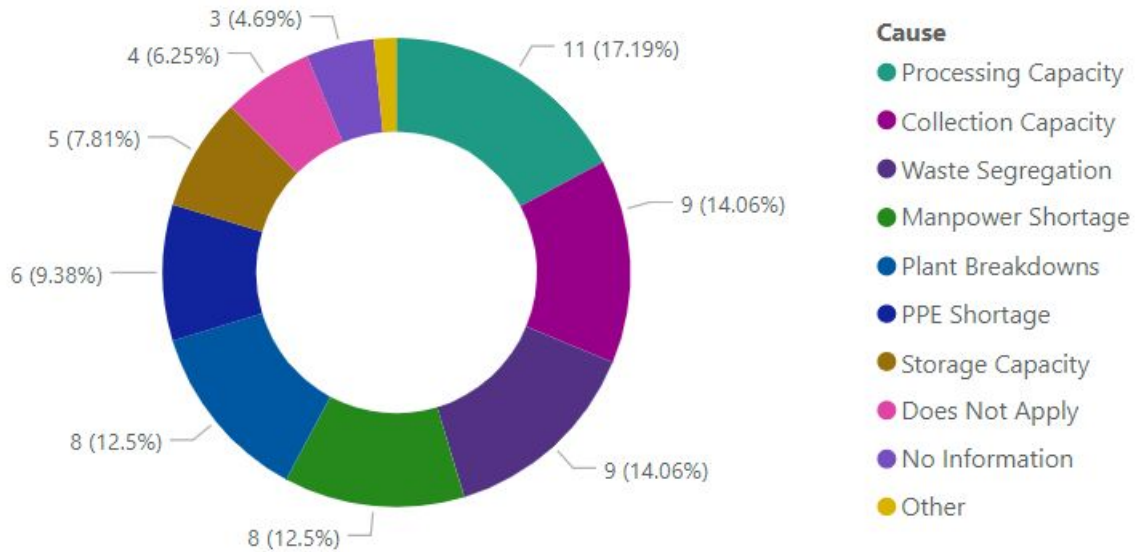
Over half of government respondents identified that there were HCW service disruptions during the COVID-19 pandemic.

HCW Treatment Collection, Tx, Disposal Disruption



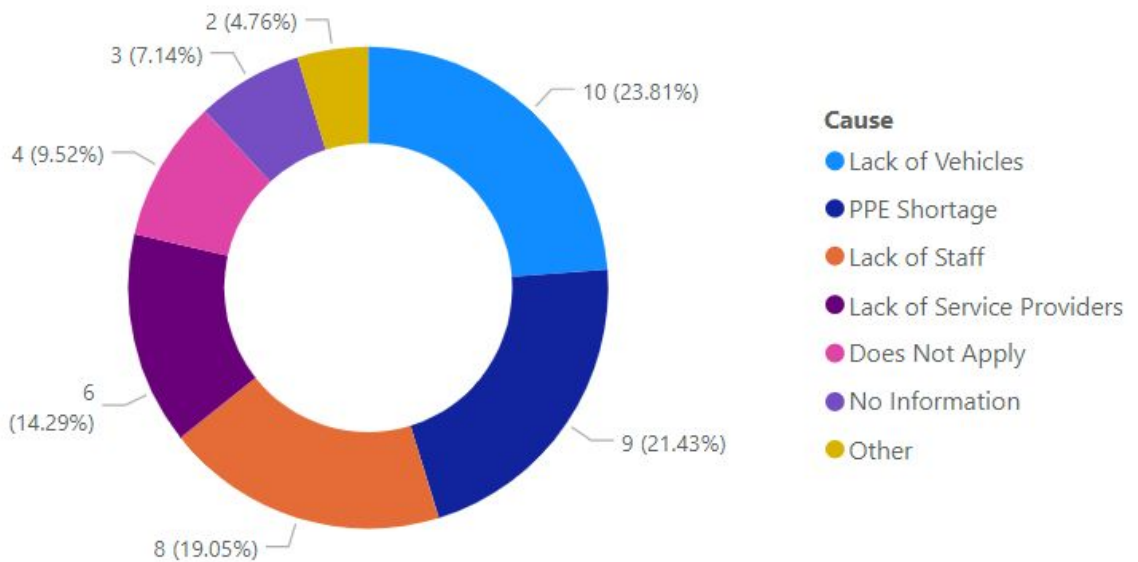
The top cited causes for the treatment and disposal disruptions are: **Overall insufficient processing capacity for treatment or disposal, insufficient capacity for collection and transportation, and improper segregation of waste at HCFs.**

Causes of Waste Treatment or Disposal Disruption



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

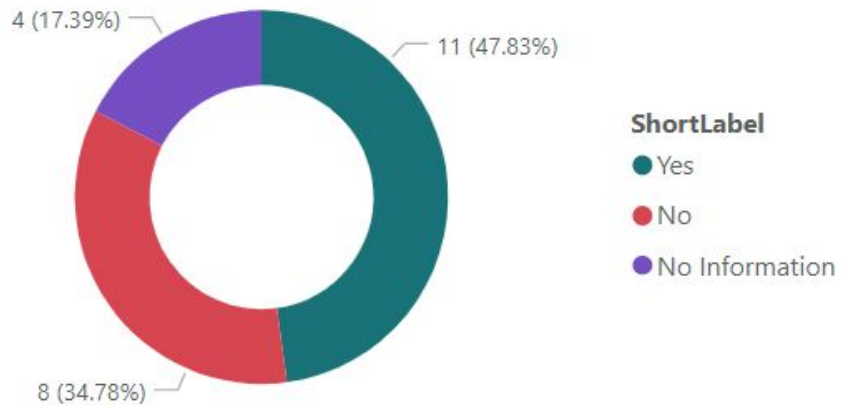
Causes of Collection Service Disruption



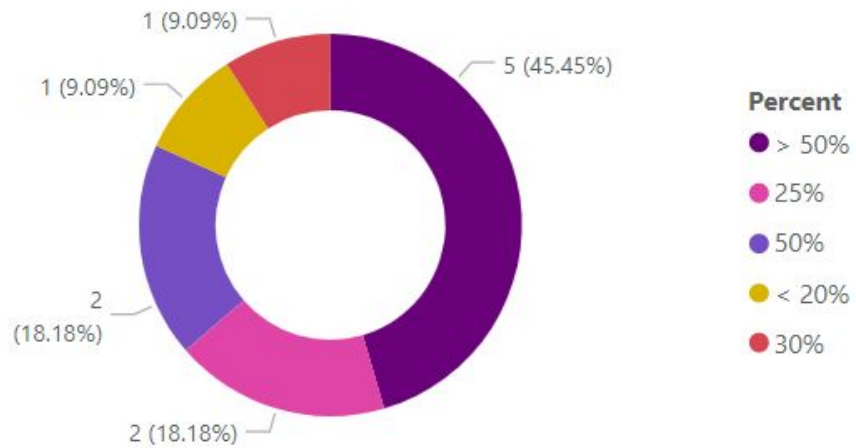
Most of the surveyed service providers **indicated there were no service disruptions for collection** (13/16 respondents) and over half **indicated that there were no service disruptions for disposal of HC waste** (7/11 respondents).

Almost half of service providers **evidenced illegal dumping of HC waste**, and 7 out of 11 of these respondents considered **illegal dumping of HCW to account for 50% or more of legal disposal.**

Evidenced Illegal HCW Dumping?



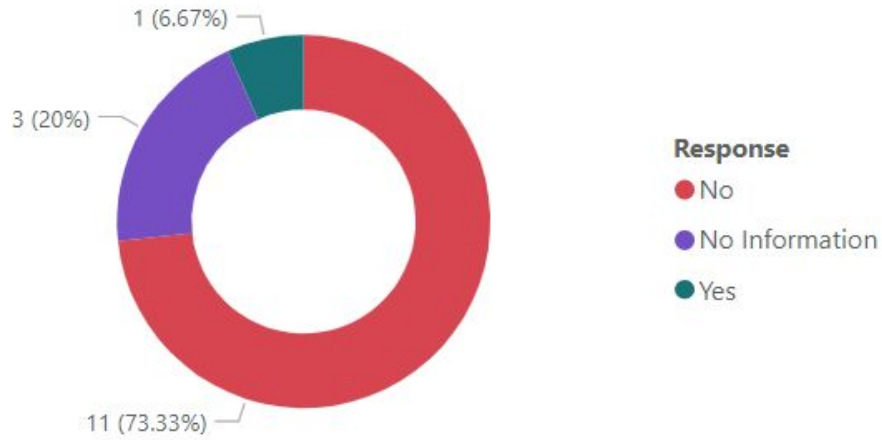
Illegal Dumping as Percent of Legal Dumping



c. Emergency Treatment and Disposal

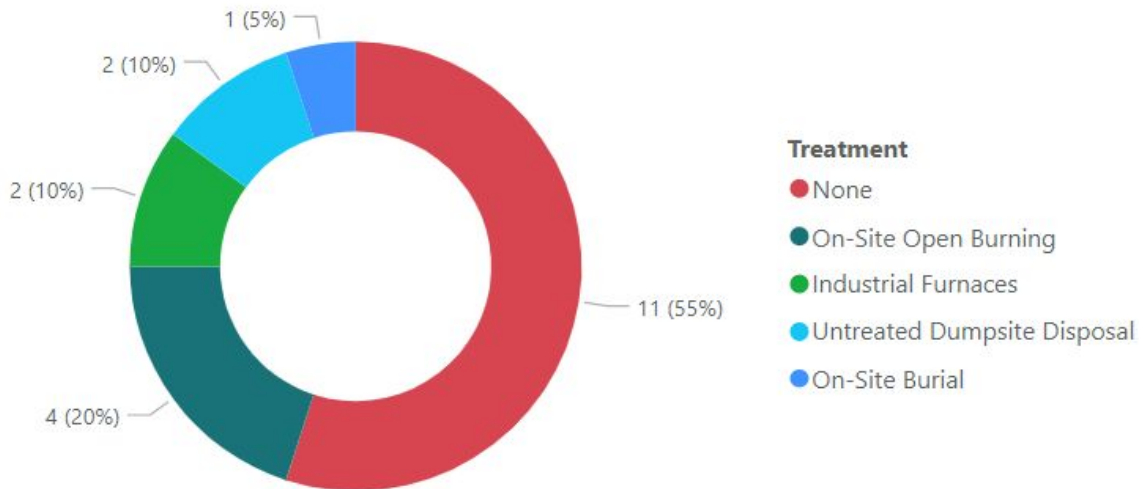
Most service providers indicated that they were **not using emergency health care waste treatment during pandemic.**

Did Org Open Emergency HCW Tx Sites?



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

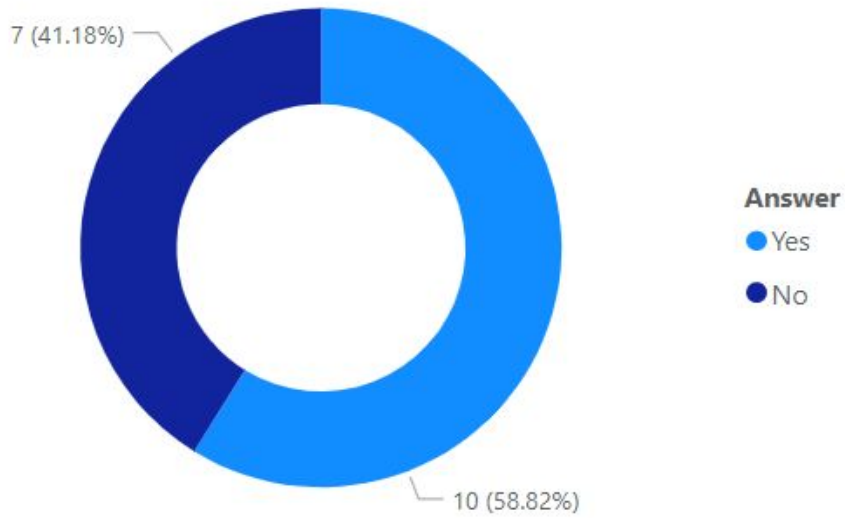
Other Emergency Treatment



d. Lack of training for work crews

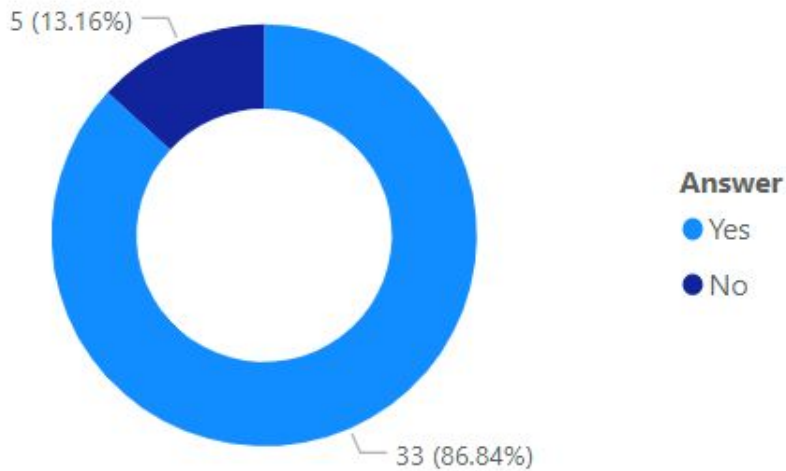
Seven out of 17 government respondents identified that there was **no training for waste workers during COVID-19**.

HCW Training for Waste Workers for COVID-19?



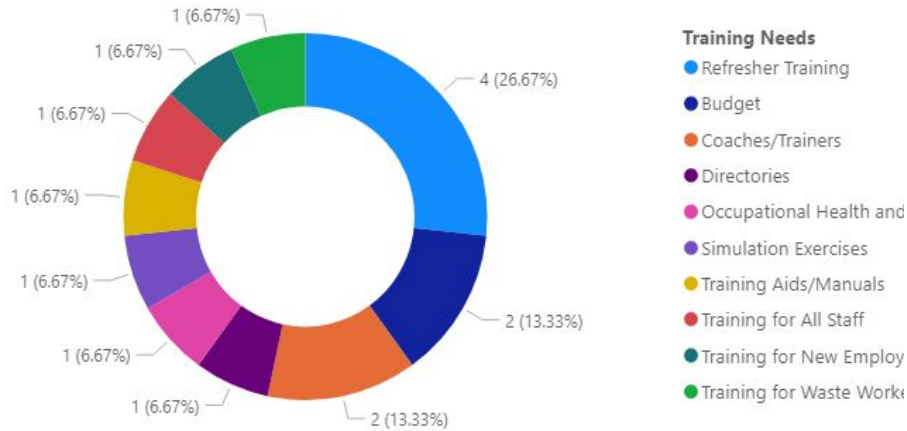
Most HCFs indicated that they **did offer training sessions on HCWM during COVID-19.**

Any Training/Awareness Sessions During COVID-19?



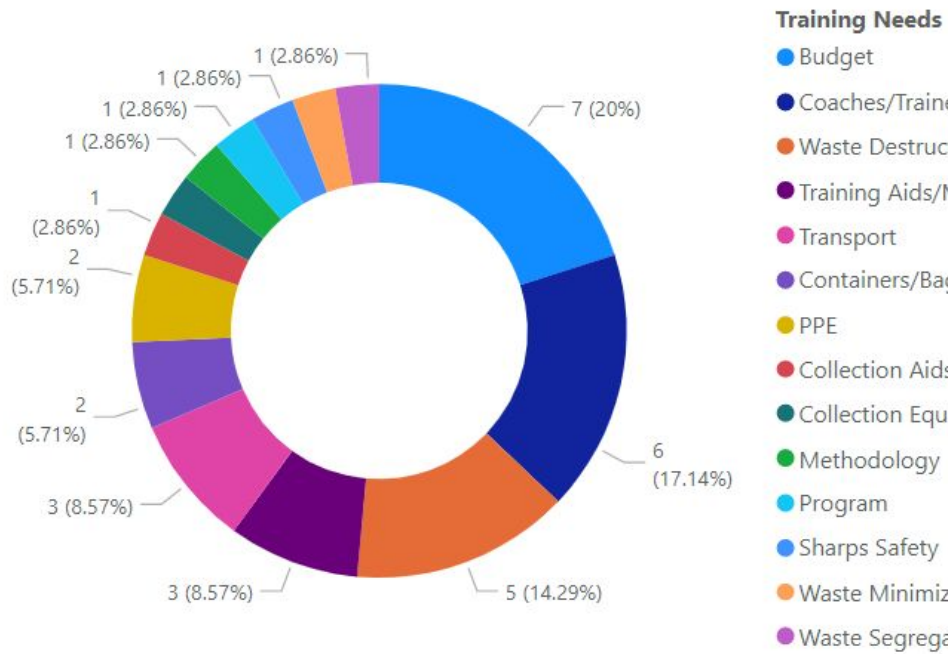
Analyzing the training needs shared by service providers we see that the most common needs are: **refresher training, budget and coaches/trainers.**

Training Needs



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

Training Needs

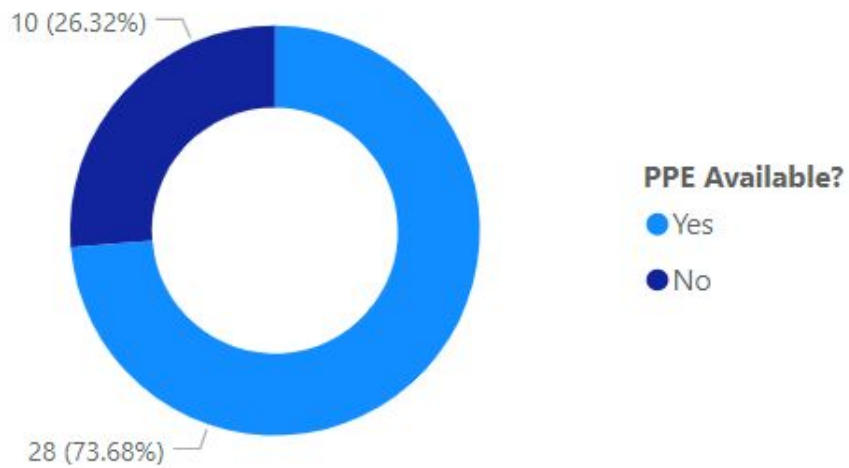


e. H&S Risks - waste handling

“ 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:**

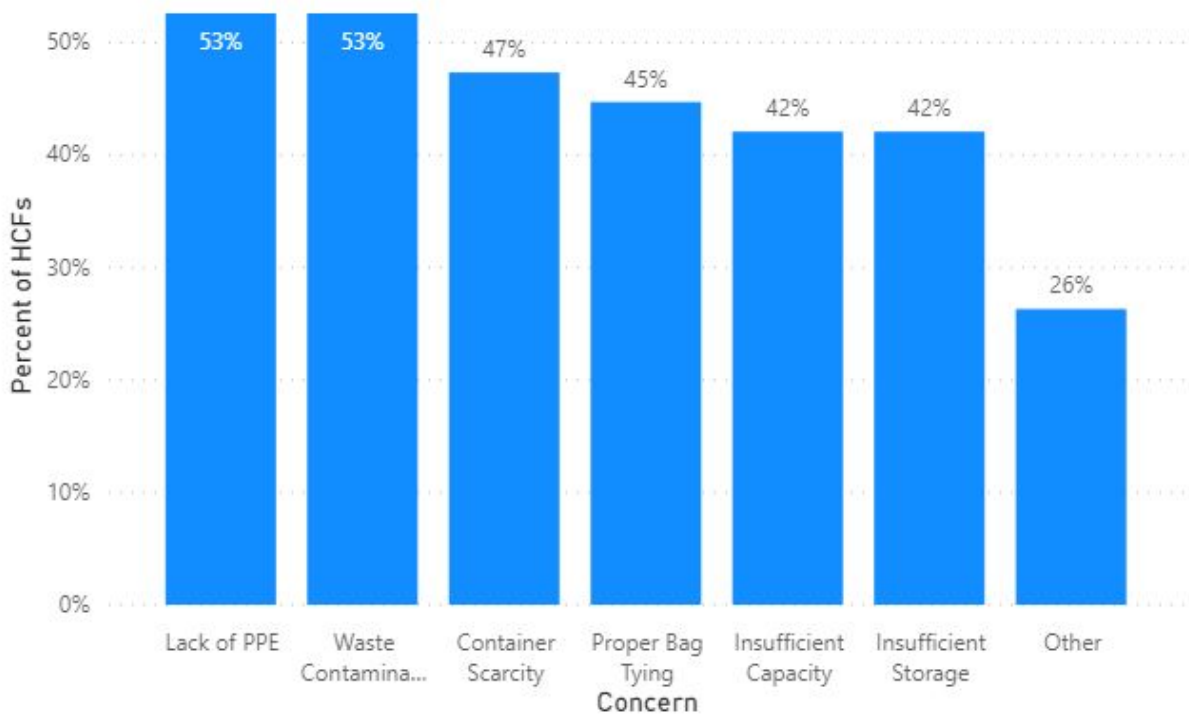
HCW PPE Availability



But this PPE seems to be insufficient as noted by respondents in the major concerns during waste handling:

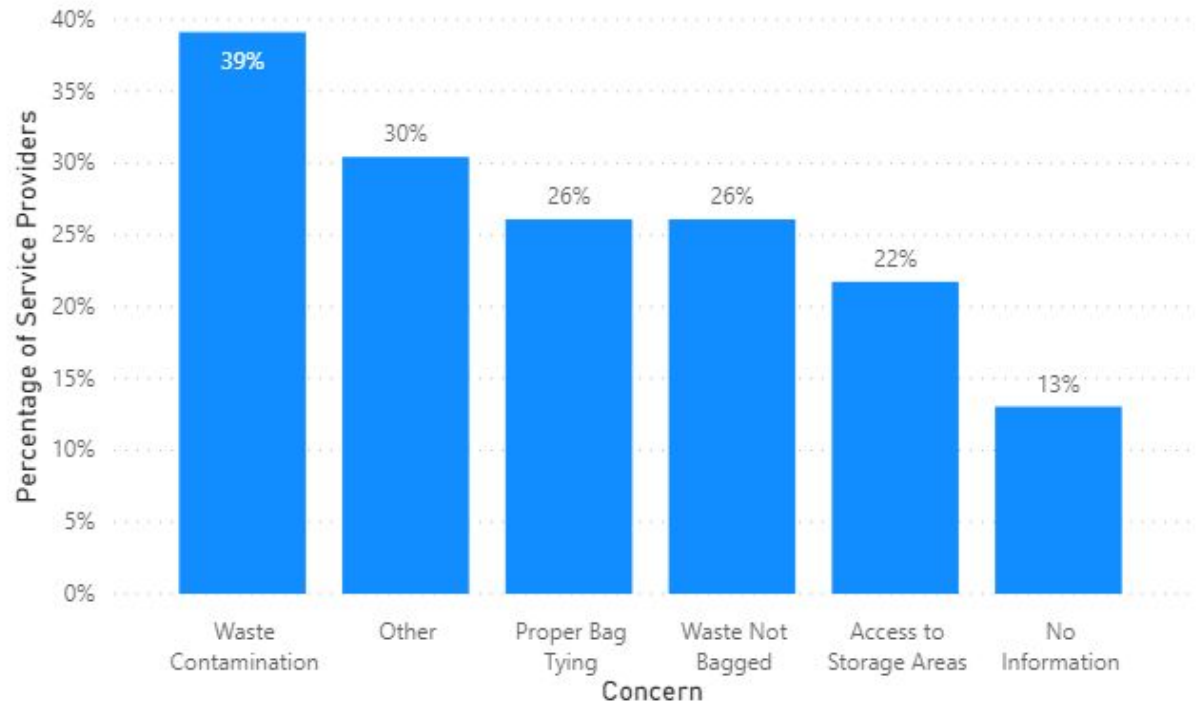
- 1) **Lack of PPE**
- 2) **Major contamination (improper segregation)**
- 3) **Scarcity of waste containers and plastic bags**

Biggest Waste Handling Concerns



For Service providers, **waste contamination (improperly segregated waste)** was the major concern for waste handlers.

Major HCW Handling Concerns



Key Feedback from Survey Responses

“Strategic planning is lacking in waste management at 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. 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 doesn't pay on time and the private banking does not support the sector so this limits our participation in state licitations) – 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 attracting additional investment” – Service Provider in Kyrgyzstan

“We have been renting incineration facility from general/central hospital. The capacity of the waste we collected was more than the capacity the incinerators can handle. The incinerators were not working up to standard and had to travel 120km for safe disposal of the waste on 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 time ticking 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

- A major concern shared by survey respondents is insufficient funding in this sector, both inside and outside HCFs. Unfortunately, the economic challenges brought on by the pandemic on a global scale can 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, is still 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 on any given country. The overall perception of government respondents is that there was a considerable increase in HCW during the pandemic (100% increase or more). Most service provider respondents also indicated a qualitative increase in HC waste collection, treatment and disposal.

Even with this restricted 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 access to untreated HCW
- Lack of planned investment in the HC treatment facilities and,
- 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 in Osaka, Japan: “the process of institutionalization of a good healthcare 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 timelines**, 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 put together during this rapid assessment present focus HCWM challenge areas highlighted by survey respondents and past assessments found during research (See individual Country Reports in Annexes) 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 capacity to improve by sector. This step can be coupled 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. Establish strategic HCWM areas to improve, in order of priority, 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 be tied to a problem or challenge identified in Step 1. An important aspect to highlight is that sustainable funding for the operations of health care waste facilities need 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 for each location and system:

1. Development of a comprehensive legal framework on HCWM including HCWM 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 SoPs.
3. Institutionalization of HCWM capacity building into the current training system (ie. including HCWM modules into the curricula of medical universities, medical schools, nursing schools, continuing education for medical professionals, etc.)
4. Add awareness raising campaigns to elevate the priority of HCWM for 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 it is not monitored, it will be impossible to improve management at the national level
8. Aiming to use the most environmentally and climate friendly technologies. Avoiding incineration, especially low technology units without air pollution control devices. Establishing recycling for non-hazardous materials, including biogas 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 bought by the national healthcare system. For example, avoid 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](#)), ask suppliers to take back particularly problematic products at the 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 that are identified by stakeholders in this report. The safety of HCWM systems and of the individuals who participate in them depend on the response to these immediate needs as well as planning for longer term response.

Finally, landfill organizations were not reached by this rapid assessment so their engagement is crucial in future assessments 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's important to:

1. Define who are the landfill management organizations (public or private entities, cooperatives, unionized, etc) and their level of influence (i.e. low, medium, high);
2. Understand how are they currently engaging in HCWM;
3. Identify what is the purpose to engage them 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
JMP (WHO, UNICEF)	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	
UNEP	June 2020	National medical waste capacity assessment - COVID-19 Waste Management Factsheet	
UNEP	June 2020	How to choose your waste management - COVID-19 Waste Management Factsheet	
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

a. Government Survey

- i. Kobo Link: <https://ee.kobotoolbox.org/x/Mdp5dkwM>
- ii. Word Doc

b. Service Provider Survey

- i. Kobo Link: <https://ee.kobotoolbox.org/x/L5uA70hs>
- ii. Word Doc

c. Health care Facilities Survey

- i. Kobo Link: <https://ee.kobotoolbox.org/x/1ZVjZMbM>
- ii. Word Doc

B. Country Reports

- a. Ghana
- b. Jordan
- c. Kyrgyzstan
- d. Serbia
- e. Sudan
- f. Zimbabwe

C. Raw Survey Response Data and Power Bi Dashboards

- a. Government
- b. Service Provider
- c. HCFs