

Project Factsheet

Demonstration of non-incineration waste treatment technologies in Africa

Background

The safe and environmentally friendly treatment of potentially hazardous healthcare waste (HCW) in Africa is a well-known challenge. Since the beginning of this millennium, thousands of small, locally built, incinerators were installed as interim solutions. In parallel, fossil fuel fired, basic industrial incinerators were set up. Both type of incinerators improved the hygiene situation but created a new problem: the generation of hazardous emissions. Unfortunately, the long-term operation of the systems showed that both types of incinerators are not sustainable due to short lifetime and significant maintenance problems. Often the systems cannot be operated due to shortage of fuel. Today, both types of incinerators experience strong criticism, as they are one of the main sources of unintentionally produced persistent organic pollutants (UPOPs) like dioxins and furans.



(Old incinerator at the University Teaching Hospital, Lusaka, Zambia, 2018)

Persistent organic pollutants are chemical substances that persist in the environment, bio-accumulate through the food web, and pose a risk of causing adverse effects to human health and the environment. In 2001, the Stockholm convention was signed to eliminate or reduce the release of these substances that includes UPOPs. As of April 2019, 182 countries are party to this multilateral environmental agreement to protect human health and the environment.

One objective of this project is to introduce alternatives to the troublesome incineration. One proven alternative is the decontamination of the waste by saturated steam. Most hazardous healthcare waste (>80%) is biohazardous waste— waste that may be contaminated with pathogens like infectious waste or sharp items such as needles and scalpels. Waste contaminated with pathogens can be killed in an environmentally friendly way by steam treatment, as it is done for more than hundred years for the sterilization of medical instruments.

Approach

The target for alternative treatment is to make available affordable non-incineration HCW treatment systems that are conformed to Best Available Technologies (BAT) of the Stockholm Convention and to demonstrate the sustainable operation of these systems in African countries. To achieve this goal, it is necessary to build national capacity to enable the planning and implementation of healthcare waste management (HCWM) systems. The national policies and regulatory framework pertaining to HCW have to be adjusted to allow the usage of alternative treatment technologies. Operation and maintenance of the new systems needs to be demonstrated to be able to replicate the new strategies.

In the four project countries (Ghana, Madagascar, Tanzania and Zambia) pilot healthcare facilities were selected for the set up and demonstration of alternative waste treatment solutions. Buildings were constructed to accommodate the treatment systems and the infrastructure (electricity, water, waste water) needs to be adjusted. In addition, the internal waste logistic system has been reengineered and staff have been trained on operation and maintenance of the new technology.



(New HCW treatment site, Cape Coast Teaching Hospital, Ghana, 2018)

Activities

- The national legal framework of the countries was reviewed, to pave the way to establish, operate and monitor the new waste technology and related logistics.
- A total of 14 healthcare facilities (HCF) in the four countries were selected to become pilot/model sites for demonstrating the sustainable usage of steam-based treatment technologies for the decontamination of biohazardous waste. Central procurement of 18 autoclave systems (different capacity for different level of hospitals), including supporting equipment and logistic equipment

- Technical support to the locally financed construction of housing and infrastructure for the installation of the treatment systems
- Installation and commissioning of the systems. Start-up of the new waste management & treatment systems
- Training of operators and technicians on the operation and maintenance of the equipment
- Setting up a national maintenance network and preventive maintenance scheme, securing future supply of spare parts by having a network of local agents of the supplier
- Implementing a monitoring system for waste treatment (quantity as well as quality).



(New autoclaves, installed at Kabwe Regional Hospital, Zambia, 2019)

Challenges

- The treatment of hazardous waste unavoidably creates cost for the operation and maintenance of the system. Even though this is a small amount compared to the overall budget of a healthcare facility, it is a major challenge as no budget line was available in the past. Insourcing of waste treatment services (e.g. from healthcare facilities in close distance) or the set-up of photovoltaic systems to compensate electricity costs are possible strategies to overcome this challenge.
- Despite the fact that decontaminated waste holds no threat to humans or the environment, there are often fears about the disposal of this waste in municipal dumpsites. Methods to overcome this barrier include creation of separate cells within landfills and clear instructions on final disposal in guidelines from the environmental authorities. If unavoidable, the compaction or shredding of the waste can be considered but will create additional operation costs and maintenance problems.
- Maintenance of technical equipment is one of the core problems of the African healthcare sector and often results equipment remaining unused. Procurement of equipment only from suppliers with a local agent network, providing spare part packages, capacity building of technicians on national and local level and selection of robust equipment designed to work under specific environment situations are a key to increase sustainability.
- Infrastructure (electricity, water, drainage/sewerage) at African healthcare facilities is often weak and partially absent. Carrying out an infrastructure assessment strengthening infrastructure where necessary and selecting appropriate technology is essential prior the procurement of equipment.

Outcomes

- In all four countries, the alternative waste treatment technologies were successfully installed and are in operation. Each month, several tons of hazardous biomedical waste are treated in an environmentally friendly and safe way. The unintentional production of POPs is reduced.

- The new treatment sites can act as models for replication in other healthcare facilities.
- Capacity to set up, operate and maintain new facilities exists in all four countries.
- Key decision makers are aware of the environmentally sustainable solution and are supporting the operation and the set-up of new treatment sites.
- The health systems in the countries are aware of their environmental impact in regard to UPOPs and understand their responsibility under the Stockholm convention.

Lessons learned

- The introduction of a new technology does not only require the production and installation of the equipment but requires ensuring that the long-term sustainability of the equipment can be guaranteed by the creation of an enabling environment.
- Improvement of the general HCW management system, especially segregation to reduce amounts of to be treated waste, must be included. This requires the supply of minor equipment such as bins and containers and ongoing staff training, monitoring and enforcement.
- During budget planning, a full cost analysis is required which must include cost for improvement of infrastructure, cost for equipment housing, the cost to start up the equipment and to maintain it.
- Supporting infrastructure and equipment such as three phase power, voltage stabilizers, water purification and treatment systems need to be included.

Impacts through testimony

Dr. Ernest Konadu Siedu, Head, National Quality Management Unit, Ministry of Health in Ghana said, *“In line with Stockholm Convention, Ghana is aligned to non-incineration waste management by adopting autoclaving to reduce Unintended Persistent Organic Pollutants. This is evident in some health facilities at all levels including project’s pilot hospitals - Cape Coast Teaching Hospital, Eastern Regional Hospital, Accra Regional Hospital, Central Regional Hospital, Tegbi Health Centre, and the like.”*

At a glance

Objective:	Implement best environmental practices and introduce non-incineration healthcare waste treatment technologies and mercury-free medical devices in four Sub-Saharan African countries to reduce harmful releases from the health sector
Financing:	\$ 6,453,195 (GEF financing) \$ 28,936,164 (co-financing)
Term:	December 2015 until April 2020
Countries:	Ghana, Madagascar, Tanzania, Zambia
Agency:	UNDP Istanbul Regional Hub for ECIS
Partner:	WHO - World Health Organization HCWH - Health Care Without Harm
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