Health impact assessment and evaluation of a clinical waste management policy for Cameroon

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Abstract

Health impact assessment (HIA) was carried out to evaluate development of a clinical waste management policy for Cameroon. Fifteen stakeholders of different portfolios within the health sector were selected during a HIA initiating study trip to the Northwest region of Cameroon. Questionnaires were then developed and emailed to the stakeholders. The stakeholders identified cross-contamination, environmental pollution, physical injuries and poor waste management sites as potential risk factors that can be associated with poor clinical waste management. They recommended strong economic and political capital as a prerequisite for the development and implementation of a successful clinical waste policy. Local impacts on health, according to the stakeholders, should be prioritized in deciding any treatment and disposal option. The whole HIA process run through 2008-2010.

Introduction

Waste management is the process of collection, transportation, processing, recycling and/or disposal and monitoring of waste materials. Depending on the type of waste material, this process can vary considerably, with emphasis on waste segregation and disposal options in order to curb possible impacts on public health and the environment. Variations in waste management exist in developed and developing nations, urban and rural areas and also in residential and industrial complexes. While the difference in developed and developing nations can be tied down to institutional and policy issues, the difference in urban and rural areas and residential and industrial areas is due to the type and quantity of the waste generated.[1] Medical establishments such as hospitals and associated research institutions also generate sizable amounts of potentially hazardous and non-hazardous waste such as syringes and needles, utility gloves, pathological waste, and card boards and domestic type of waste. High trends in rural exodus in developing nations potentially add pressure on an already fragile urban healthcare system.[2] As a means to cope with such pressure, public healthcare infrastructure is expanded and other services included which, leads to an increase in the amount of generated clinical waste. Local, regional and national authorities are thus faced with challenges to safely collect; treat and dispose the waste in a manner that is compatible with international standards. Typical economic and political problems in such countries take the blame for insufficient social and educational resources and infrastructure, which in turn contribute towards failures in effective clinical waste management.[3]

The Ministry of Public Health is the umbrella organization responsible for maintenance of all public health services in Cameroon. Healthcare in Cameroon is provided via various public and private establishments, organizations and institutions. Despite the heavy presence of the private sector (profit and non-profit organizations), traditional healers, Chinese traditional medicine, the public health sector is still the main provider due to its relatively low cost and availability. About 5.5% of the country's gross domestic product is spent on the improvement of healthcare services. The management and operation of the healthcare system in Cameroon can be divided into three levels: the central (strategic) level, which is based in the capital Yaoundé; the intermediary (technical) and finally the peripheral (operational). Healthcare services are provided by hospitals and clinics. There are an estimated 178 health districts, with 162 district hospitals, of which only 154 of these hospitals are operational. Additionally, there are an estimated 2043 public medical facilities, most of which are located in the urban areas of the country. There is adequate supply of pharmacies in major towns and the doctor-to-patient ratio in the country is about 1:12,500, which is one of the lowest ratios in the world according to the 2010 World Statistics.

Clinical waste management in Cameroon is ineffective, part due to the absence of an elaborate clinical waste management policy and also due to the knowledge, attitude and practice of the people involved in the sector. Waste is seldom segregated in the hospitals and it is common to see potentially infectious items such as needles, syringes, scalpel blades and intravenous sets among other waste materials piled-up around hospital complexes. In some cases, sub-standard incinerators plagued with site and reliability issues are constructed and used to burn the waste.[4] Such poor disposal practices evidently raise apprehension towards environmental protection and public health, which subsequently pushes the government to step in with a policy accompanied by an effective support structure. Any such government action directed at protecting public health and the environment must seek to balance efficiency and equity while maintaining the flexibility to adjust to changing conditions.[5]

Article 17 of Law No 96/12 of 5th August 1996 prescribes environmental impact assessment (EIA) for all projects in Cameroon that can cause environmental degradation. To further buttress the law, a national environmental management plan requires EIA as a mechanism to make sure that the implementation of some projects does not negatively affect the environment.[6] Furthermore, a permanent secretariat in the Ministry of Environment and the Protection of Nature is responsible for ensuring effective EIA nationwide. It can therefore be said that EIA is well established within the legal framework in Cameroon. The practice is however plagued with procedural flaws in scoping, inadequate baseline data, high administrative fees, and absence of an appeal procedure, unclear proviso, and incompetent personnel and over centralization of the EIA powers.[7]

Health impact assessment (HIA) examines possible health impacts of policies and programs.[8] Issues related to waste management

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has also been subjected to HIA. A good example is a case study by Elliott, Golby and Williams cited by Wistmar *et al.*,[9] and more examples can be found in the HIA gateway (http://www.apho.org.uk/default.aspx?RID=44538). The main reason for carrying out the presented HIA process is to assess stakeholder's knowledge on potential impacts on health and wellbeing any clinical waste management policy will have on the community. Objectives as applied to the study include development of recommendations for decision makers on how to improve clinical waste management in Cameroon based on results from the HIA process and emphasize the necessity for working partnership to facilitate the consultation process with stakeholders.

Materials and Methods

All stages of HIA, that is; screening, scoping, risk appraisal and evaluation and reporting were used in this study. No thorough screening tool was used to determine if HIA was necessary. This was because neither a policy or draft documents for a policy on clinical waste management for Cameroon existed when this study was commissioned. Scoping was done in two phases; first the identification of 15 stakeholders through consultations with officials in the government and private sectors. These were officials from the Regional Delegation for Public Health in the Northwest region of Cameroon, members of local hospital management committees and managers of non-governmental organizations with interest in waste management; no other regions of Cameroon or central government was involved in study. This first phase was completed in 2008. The second phase involved the search of evidence to support the HIA process and the identification of risk factors associated with poor clinical waste management. This was carried out through emailing survey questionnaires to the 15 stakeholders; this phase was done in 2010. Responses were coded in Stata 11 where key themes specific to the HIA evaluation objectives and other relevant issues that emerged during the process were analysed. The time period between two scoping surveys was used to gather pilot information upon exposure (waste management and incineration practices, ash sampling and analysis) and possible health outcome measurement (morbidity study); none of these is subject of this manuscript.

Results and Discussion

Screening

The HIA process was initiated in May 2008 as part of a study trip to the Northwest region of Cameroon. The trip evaluated processes of generation to disposal of clinical waste and also determine if a policy for clinical waste management existed and if such a policy was suitable for an HIA. Unfortunately, it was found out that such a policy did not exist at the time of the study, which led to the decision to conduct the HIA based on the two reasons below and as an of evaluation of the need and content of such a policy: i) it was observed that clinical establishments and their waste treatment and disposal sites are located within communities. Consequently, emissions and contaminants from such sites can directly or indirectly affect the health of the community; ii) poor clinical waste management is a cause for concern as it can contribute significant occupational health risks.

Scoping

Basic information on the stakeholders such as job type and years of experience is summarized in Table 1.

Evidence base for the health impact assessment process

The evidence base in HIA is not fully authoritative in all areas and may be open to difference in interpretations or emphasis.[10] Sources of such evidences for HIA can include published literature, local data and stakeholder experience.[11] Table 2 indicates the different areas identified by the stakeholders where evidence could be collected for in-depth assessment prior to drafting a policy for clinical waste management.

Treatment and disposal methods with a score of 12 and site of waste disposal with a score of 11 on 15 respectively contain, according to the stakeholders, strong evidence for in depth assessment in the HIA process prior to a decision by policy makers. In literature, nine ways can be distinguished in which evidence on health and its determinants can be related to policy and the most complete of these is an analysis of health effects in the context of a comparison of options.[12] In the context of waste management, there is no single method of waste treatment or disposal that completely eliminates all risks to the public or the environment.[13] Evidence of poor clinical waste management according to the respondents existed either within their personal work environment, within the premises of the establishment and elsewhere especially around municipal waste bins. As concerns development of a clinical waste policy, the respondents proposed that the government should open consultations with all stakeholders that are directly or indirectly involved in the clinical waste management process. As examples, they identified researchers in state universities for strong evidence base, community groups and service providers to facilitate implementation of the policy and finally the local government administration for advocacy. Bi/multilateral partners, including national and international organizations were listed as facilitators and fund providers. It is important that recognised that the costs required for establishing and maintaining effective systems for the disposal of such wastes may far exceed available resources thus requiring global action to ensure a lasting solution.[3]

Table 1. Basic information on stakeholders who took part in the scoping process.

Stakeholders	Job/Position	Sector/Affiliation	Years of experience
1	DMO	Healthcare provision/administration	14
2	DMO	Healthcare provision/administration	22
3	DMO	Healthcare provision/administration	22
4	IPN	Healthcare infection control	10
5	HPS	Pharmacy service	5
6	CMO/SSTP	Healthcare provision/administration	10
7	IPN	Healthcare infection control	5
8	GP	Healthcare provision	5
9	GP	Healthcare provision	5
10	HD	Healthcare provision/administration	15
11	Waste auditor	NGO	5
12	Chair person	Health management community	2
13	Member	Health management community	3
14	Waste picker/cleaner	Healthcare centre	3
15	Incinerator operator	Healthcare centre	4

DMO, district medical officer; IPN, integrated physician network; HPS, hospital pharmacy servant; CMO, chief marketing officer; GP, genaral practitioner; HD, hospital director; NGO, non-governmental organizations.

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Risk factors associated with poor clinical waste management

The most important risk factors and the total score of each as listed by the respondents are presented in Table 3. Others that could not identify with any of the four included economic and social setback in the community.

Cross/autoinfection with a score of 15, according to the respondents is the most important risk factor when it comes to poor clinical waste management. This could occur through physical injuries that were proposed as a risk factor by 10 of the 15 respondents. Management of sharps within the clinical establishment is important when it comes to control of physical injuries and cross/autoinfection. Sharps are potentially one of the biggest hazards in clinical waste.[14] Healthcare associated infections complicates between 5 and 10% of admissions in acute care hospitals in industrialised nations with the same risk 2 to 20 times higher in developing nations with the proportion of infected patients frequently exceeding 25%.[15] Understaffing and low levels of staff preparedness and knowledge are key factors leading to poor infection control in developing countries.[16] These factors are consistent with facts in a WHO Health Report which revealed based on worldwide estimations that 57 developing countries currently have critical staff shortages that equals a global deficit of 2.4 million physicians, nurses and midwives.[17] As a result of such a shortage, the authors additionally mentions that the education and recruitment of infection control professionals is far from realistic since government priorities are not primarily committed to developing infection control policies and standards. Environmental contamination of soil, water and air was the next high priority risk factor with a score of 11 among the 15 stakeholders. By-products and emissions from treatment and disposal methods are responsible for potential contamination of water, air and soil. Incineration is credited for reducing the volume and size of the waste and for destroying all potential pathogens in the waste stream and also discredited for emission of potential toxic chemicals in to the environment.[18-20] Surface dumps and open landfills attract vermin and release unpleasant smells which may be equated to the release of potentially infective organisms by the public. All the respondents identified communities living in proximity to a clinical waste disposal site as those highly exposed to any emissions. They also recognised that other communities could suffer indirect exposures through surface and ground water contamination and through the extent of the moving plum from incinerators. It is therefore imperative that local impacts on health from prospective waste management facilities as identified by Kemm be considered by the local decision making processes.[21]

Risk appraisal

The health status of an individual or community of people is for the most part influenced by factors which are outside of the healthcare sector.[11] Changes influencing the physical and social environment and behavioural patterns contribute either negatively or positively to health outcomes. Reliable synthesis of evidence and prediction of all health impacts is likely to be difficult, even though it remains crucial to the HIA process.[22] Decisions and policy issues involving clinical waste management can incorporate the process of HIA since HIA can be associated with a lot of health risks as well as health benefits. Several factors as shown in Table 4[23-35] determine the health effects which can result from poor clinical waste management and the factors emphasize how challenging it can to come up with a comprehensive and policy-relevant impact assessment. The type and magnitude of health effects comprehensibly depend on the treatment and disposal method. Therefore any criteria developed to facilitate decision making

Table 2. Evidence base to support the health impact assessment process.

	Site of waste disposal	Treatment and disposal methods	Cost of management	Others
1	X	X		X
2	X	X		X
3			X	X
4	X	X		
5				X
6				X
7	X	X	X	X
8	X	X		X
9	X	X		
10		X	X	X
11	X	X	X	
12	X	X	X	
13	X	X	X	
14	X	X	X	X
15	X	X	X	X
Score	11	12	8	10

X, yes.

Table 3. Important risk factors linked to poor clinical waste management.

	Physical injuries	Environmental contamination	Breeding ground for vectors	Cross/auto infection	Others
1	X			X	X
2		X	X	X	
3				X	X
4	X	X	X	X	
5				X	X
6	X		X	X	
7	X	X		X	
8	X	X	X	X	X
9		X		X	
10		X	X	X	
11	X	X	X	X	
12	X	X		X	
13	X	X	X	X	X
14	X	X		X	
15	X	X		X	
Score	10	11	7	15	5

X, yes.

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and selection of a treatment and disposal method would need to suit specific considerations such as the amount of clinical waste generated by a facility, segregation measures put in place, the material and human resource potential of that facility with respect to operation and maintenance. Other considerations would be the site of the treatment or disposal unit with respect to community proximity. Also information on the geology of the area with respect to the level of ground water is important especially when land filling is under consideration.

Diseases and health determinants occur along a continuum of complex and multi-factorial layers of causality.[36] This is vital when it comes to on-site or off-site treatment and disposal methods since policies for either of the two will have to address public apprehensions with distal and/ or proximal determinants of health. Populations close to the on-site unit will like factors such as potential daily emissions and noise be addressed in the policy. Such policies will therefore invest heavily on advanced emission control and noise minimization technologies. A policy that favours off-site treatment will escape such hassle, but will have to deal with ensuring safe transportation of the waste to the treatment and disposal location.

Evaluation and reporting

HIA can be evaluated from three standpoints of predicting health impacts in a robust manner, stakeholder participation and to inform the decision making process.[37] The evaluation process specifically assesses the quality of analysis for policy and not the quality of the policy.[37] Other evaluation models of HIA such as that which provides a criteria for product and process evaluation is adapted for this HIA and shown in Table 5. Outcome usually refers to the health goals underlined in the purpose of the HIA and those are sometimes difficult to measure. In our analysis, outcomes were objective recommendations developed by the stakeholders for a clinical waste management policy in Cameroon. Impact evaluation as used in Table 5 refers to the influence HIA might have on the policy and should therefore not be confused with the assessment of the health impacts from the policy.[38] No formal report of the HIA process was produced as mentioned in Table 5. This is because the HIA was conducted out of academic interests. A published manuscript in a peer review journal containing the findings from the process remains the only way to evaluate the quality of the product.

The HIA process was successful in its mission of introducing the concept of HIA to stakeholders. All the stakeholders indicated a lack of sufficient awareness on both the concept and process of HIA. But most importantly, they were happy to have learned and be part of the process. Because consultations with stakeholders were done electronically, some of them expressed the need for face-to-face and group seminar consultation during the screening and scoping phases. The stakeholders also identified vital risk factors linked with poor clinical waste management (odour, air pollution, land and water pollution and the potential for accidents), which can be seen as an indication of their awareness on associated health impacts. The risk factors identified by the stakeholders were essential in the risk appraisal phase. The stakeholders listed numerous recommendations on how to improve clinical waste management in Cameroon. The exhaustive list was condensed by authors as shown in Table 6 based on recommendations in international guidelines, and then rated based on subjective logical arguments.

Professional and commercial involvement in the clinical waste management process according to the stakeholders is necessary but not strong at the moment in Cameroon. The

Table 4. Determinants of health and potential health impacts that can be associated with poor clinical waste management.

Determinants of health	Source(s)	Potential health impacts/outcomes	References
Air pollution	Incineration Uncontrolled burning	Cancer Cardiovascular disease Respiratory disease Allergies Annoyance	Allsopp *et al.*[24] Chen *et al.*[25] Cohen and Pope[26] Dennekamp and Abramson[27]
Land and water pollution	Leachate Bottom and fly ash	As above	Allsopp *et al.*[24] van Grinsven *et al.*[28] Wang *et al.*[29]
Odour	Open landfills Open dumps Combustion	Annoyance Anxiety and stress Reduced quality of life	Baker *et al.*[30] Lipscomb *et al.*[31] Shusterman *et al.*[32]
Accident (fire, explosion etc.)	Uncontrolled burning Incineration	Injury Death Risk perception (over or underestimated)	Cutchin *et al.*[33] Neaman *et al.*[34] Bishai and Lee[35]

Table 5. Evaluation criteria fro the health impact assessment process.

Product (quality of the report)	Process	Impact	Outcome
A manuscript was prepared for publication in a scientific journal	What the process sought to achieve Evidence base for potential health effects How were stakeholders involved in the process? Framing and prioritization and delivering of recommendations	Stakeholder's perception of the HIA process The expectations of the stakeholders from the HIA process Influence of the process on a clinical waste management policy for Cameroon	Recommendations from stakeholders for a clinical waste management policy for Cameroon

HIA, health impact assessment.

Table 6. Recommendations on how to improve clinical waste management in Cameroon.

Recommendations	Rating*
Economic and political will	XXX
Policy on clinical waste management	XX
Research data needs	X
Professional and commercial involvement	0
Training, education and awareness campaign	X
Stakeholder participation	XX
International financial and technical assistance	XXX

*0=weak; X=strong; XX=stronger; XXX=strongest.

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economic and political will of the government is vital to facilitate the development of an elaborate policy and ensure its robustness. Full dedication by the central government in the processes leading to and implementation of the policy will guarantee its full compliance. Such a rigid policy can then dictate the role and extent of professional and commercial involvement. The need for research and reliable data becomes obvious only when the central decision makers have initiated the policy development process, even though the availability of such a data can indirectly provoke similar reactions. Training, education and awareness campaigns are important to curb apprehensions within the public, but the participation of stakeholders is even more important as it shows transparency in the management process. Economic problems can lead to shortages in infrastructure and other material resources that guarantee failure in the clinical waste management process. International and financial assistance can eliminate such a scenario. The HIA process was well received by the stakeholders and they all had positive opinions on the process. They identified that the process had been of value through sharpening their background knowledge of clinical waste and its management and had also increased their awareness of the main issues of poor clinical waste management that needs to be dealt with. The expectations of the stakeholders were precise. They look forward to a sustainable system of improved clinical waste management that guarantees reduction or complete elimination of unintended risks to hospital workers and the community. The treatment and disposal methods should be selected based on the best available technology and operated by skilled staff to as to prevent environmental pollution and the risk of accidents. The stakeholders recognized that it was difficult to precisely state how the process might influence a prospective clinical waste management policy for Cameroon. Albeit that, they pointed out that it will facilitate the availability of baseline information essential for the process. It will additionally add value, trust and transparency in the policy making-process through engaging consultations with all stakeholders.

Conclusions

This paper presented findings from a prospective HIA process. The interest from stakeholders ensured the huge success of the initiative and necessitates that the concept of/and process of HIA be initiated at all levels of the decision making process in Cameroon. Unlike EIA, there is no formal acknowledgement of HIA in Cameroon. Policies and programs are drawn-up with little or no public participation and insufficient consideration is given to potential undesired and/or unintended health outcomes. The existing structures of EIA can tremendously facilitate the integration of HIA in Cameroon. In doing so, issues such as the legal framework of EIA and HIA will need to be harmonized. Another issue will be the differences in paradigm, as the definition of health and the level of inclusion of health determinants and risk factors have to be clearly outlined. Issues such as methodological differences, framework models and the use of evidence in both processes will need to be clarified.

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