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History, evolution and future of environmental health in Uganda

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ABSTRACT

This article explores the history and evolution of Environmental Health in Uganda under four key themes: training and practice; research; governance, policy and regulatory framework; and challenges. The article also describes the future of the profession. Through a review of documents and key informant interviews, it is noted that Environmental Health in Uganda dates back to colonial times when the country was affected by diseases including plague, trypanosomiasis and small pox. Concerted efforts were advanced to train cadres that would improve the sanitation status and address the prevailing disease burden. Over several decades, the Environmental Health profession has evolved in many areas of training, practice, research and governance, policy and legal framework amidst several challenges. The future of Environmental Health in Uganda will require more advanced training and research, broadened practice, and streamlined governance.

KEYWORDS

Environmental health;
history; evolution;
future; Uganda

Introduction

Environmental Health dates back to between the thirteenth and eighteenth centuries which saw many reforms in Rome, England and USA that led efforts in understanding how the environment could affect human health.¹ One of the individuals recognized for their role in this is Sir Edwin Chadwick, an English lawyer and social reformer, who carried out extensive research on the outbreak of typhus fever and cholera (1832–1833), and proposed the “Sanitary Idea”. The idea was a directive to local health boards to provide proper drainage, pave, clean and widen streets, provide potable water, deal with nuisances and make sanitary regulations. He also recommended the appointment of Medical Officers of Health and Inspectors of Nuisances. His work and that of others are credited for their contribution to what is today known as Environmental Health. In 1854, John Snow, considered the father of Public Health traced an outbreak of cholera in London to a common drinking water source.²

Environmental Health addresses all physical, chemical, and biological factors external to a person, and

all the related factors impacting behaviors. It involves the assessment and control of those environmental factors that can potentially affect health by primarily focusing on preventing disease and creating health-supportive environments.³ Such factors include air, food and water contaminants, radionuclides, toxic chemicals, wastes, disease vectors, safety hazards and habitat alterations.⁴ Indeed, global evidence shows that environmental factors have adverse health effects to humans^{5,6} ranging from infectious diseases^{7,8} to noncommunicable diseases such as mental health,⁹ cancers,^{10–12} and cardiovascular diseases.^{13,14} In 2012, 23 and 22% of global deaths and disability adjusted life years, respectively were attributable to environmental risks with nearly 35% in regions such as sub-Saharan Africa.^{15,16} Because of this recognition, Environment Health is centrally positioned within the sustainable development goals (SDGs) with SDG 3 aiming to ensure healthy lives and promote wellbeing for all ages, and SDG 6 to ensure availability and sustainable management of water and sanitation for all. Several Environmental Health indicators are also present in the other SDGs.¹⁷

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Decades' evidence shows that Environmental Health has been evolving with changes in many aspects including delivery models¹⁸ especially with the changing environments and introduction of technology.¹⁹ Important to note is that evolution in Environmental Health has a substantial influence and shift on the disease burden including chronic²⁰ and infectious diseases as well as those emerging.^{16,21} In Uganda, Environmental Health is one of the oldest professions practiced even before the country obtained its independence in 1962 from the British colonial government. Several evolutions in Environmental Health have taken place, some entangled with the country's political and social situations including population growth and level of development. Understanding the history of Environmental Health offers insight into its origins and growth and provides important lessons for shaping the current and future direction of the profession. In this article, through document reviews and key informant interviews, we explored the history and evolution of Environmental Health in Uganda focusing on four key themes: training and practice; research; governance, policy and regulatory framework; and challenges. In addition, we highlight the future of Environmental Health in Uganda. Key informants were experienced Environmental Health professionals who were trained during the early days of the profession and the different stages of its evolution. Other key informants were from institutions that offer training at different levels. The documents reviewed were policies and laws related to Environmental Health such as the Public Health Act and the Environmental Health policy.

Training and practice

Medical officers monitored sanitation in townships

In Uganda, environmental health practice can be traced back to the arrival of the European (British) missionaries and colonialists before the year 1900 when diseases such as plague, trypanosomiasis and small pox were claiming many lives of locals. The Europeans therefore confined themselves to townships treating and curing locals within their proximity – people who were thought to be a source of immediate danger to them. A township meant and included four to five European houses, a few dozen Indian owned shops and a hundred locals, and did not include the entire area as it had been established for administrative purposes. The foreign Medical Officers treated people and oversaw sanitation, which later became overwhelming for them to handle together with

medical treatment. This led to the appointment of a special Sanitary Medical Officer in 1910 to supervise sanitation in the townships of Entebbe, Kampala, Mbale, Mbarara, Hoima and Jinja who later appointed sanitation committees, one for each of these townships. The committees were meant to supervise sanitation but fell short of their requirements and only concentrated on protection of the Europeans, leaving locals to die of preventable diseases. In 1912, the special Sanitary Medical Officer recommended for employment of a Sanitary Inspector for at least Kampala Township who was appointed in 1913. The Sanitary Inspector is said to have improved sanitation in Kampala though plague continued claiming hundreds of locals. In response,¹⁶ Plague Inspectors were appointed the same year.

In 1925, there was criticism of government policies for their neglect of preventive medicine by those in charge of sanitation. In 1928, the Deputy Director of Sanitation witnessed the death of 32,078 people due to plague and recommended the appointment of more Sanitary Inspectors to handle village sanitation. In 1930, this idea was upheld and in addition, it was suggested that native helpers needed training to maintain cleanliness around homes. The years 1931–1933 saw a lot of research on plague, malaria, helminthes and other diseases in Uganda, all recommending for health education of the local people and training of local helpers.

Local and overseas inspectors

In 1934, health overseers were trained in Teso and Busoga regions (Eastern Uganda) and these improved the rural sanitation drastically. In 1935, a European Sanitary Inspector was appointed to be instructor of hygiene and train Africans in the duty of health inspection. In 1936, 12 students some of whom were Health Overseers, were enrolled for a 3-year highly specialized training program. These later qualified as Sanitary Inspectors holding a certificate of the Royal Institute of Health of United Kingdom. With the presence of African Sanitary Inspectors, rural sanitation and hygiene improved as local people appreciated and adopted their advice. The Europeans associated the prevailing outbreaks of diseases including plague to poor housing and therefore decided to take measures, which required burning of infested houses and destruction of rats. Health Orderlies were trained through apprenticeship to enforce these measures.

In 1946 after World War II, the Government of Uganda recruited 55 of the ex-service men who had

exposure and interest in health promotion to a 15 months course in Mbale (Eastern Uganda). Thirty-five of these qualified as Hygiene Orderlies and were posted to serve a population of about 1,000 people within their local areas. These were under the supervision of African Sanitary Inspectors. Over time, the role of Hygiene Orderlies expanded and in 1948, it was thought that some form of on-job training was needed in order to improve their performance. On-job training mainly focused on housing, water, food and personal hygiene. Hygiene Orderlies were responsible for implementing home improvement activities giving rise to a title 'Nuisance Inspectors'. The hygiene orderlies training was later lifted to 2 years and they would qualify as Health Assistants (HAs), and Sanitary Inspectors later became known as Health Inspectors (HIs).

In 1949, the School of Hygiene which trained Environmental Health practitioners was transferred from Mulago (Central Uganda) to Mbale and housed within the School of Medical Assistants currently known as the School of Clinical Officers. In 1958, an independent institution, Mbale School of Hygiene, was built. This consolidated efforts of training cadres specialized in preventive health services to certificate (Health Assistants) and diploma (Health Inspectors) levels.

Joint training of health inspectors in East Africa

Mbale School of Hygiene was affiliated to the University of London, and although studies took place within Uganda, final examinations were set by the Royal Society of Health of England (RSH). Because of the increasing number of trainees over time, there was need to manage examinations locally, which prompted the RSH to appoint and approve a board of examiners from universities in East Africa to take charge of the examinations. The examinations were then attempted at the East African region level by students from three countries: Uganda, Kenya and Tanzania. Each year, examinations were held in one of the countries and this was made rotational yearly, and two sittings existed, in June and November. The final Diploma in Public Health Inspection was awarded by RSH in conjunction with the University of London and was internationally recognized.

At first, Health Inspectors were Europeans and it is believed that attempts were made to make Environmental Health training hard to obtain for the Africans. To qualify as a Health Inspector then, Africans had to undergo certificate training first to

become Health Assistants after which they would upgrade through the Diploma program to become Health Inspectors. The Europeans introduced a local (regional) cadre of Health Inspectors and these were termed as Health Inspector (East Africa) [HI (EA)] to confine the practice of the Africans to only the East Africa region and differentiate them from Europeans. Qualified HI (EA) were supervised by their Europeans counterparts but later advocated for equality with their supervisors indicating that they had undergone similar training and deserved to be at the same level. This conflict attracted a commission from Britain to come to Uganda to resolve the issue. The commission although acknowledged that most aspects of the training were similar, they recommended that the African HIs would undergo an additional 3-year training to qualify for overseas appointment like the Europeans. In 1960, African HIs were invited to train for the general overseas Diploma.

Initially, Mbale School of Hygiene was certified to train Health Inspectors who would qualify with the RSH qualification. For the initial 5 years (1959–1964), the institution was only used to upgrade the HI (EA) practitioners (who were referred to as Extensioners) to HI (overseas). In 1965, Mbale School of Hygiene started full time training for the RSH Diploma for direct entrants, and the first lot of students completed in 1967. Only 10 students were trained per year as it was believed that higher numbers would compromise the quality of training until 1969 when 17 students were admitted. The training was hands-on with 6 months field based practicals for Diploma trainees (3 months in rural and 3 months in urban areas), and 3 months for Certificate training. The qualification was awarded by the University of East Africa headquartered at Makerere University, Uganda in conjunction with the RSH and the University of London, United Kingdom.

When the East African Community (EAC) collapsed in 1977, universities within the Community: University of Nairobi (Kenya), University of Dar es Salaam (Tanzania) and Makerere University (Uganda) each took over the administration and management of their examinations locally. The President of Uganda then, Idi Amin Dada, stated that it was not important for Ugandans to sit for examinations in another country, yet Makerere University was the best in the region. He then directed Makerere University to immediately organize examinations for Environmental Health Science students which marked the end of joint rotational examinations. At Makerere University, the examinations were jointly managed by Faculties of Veterinary Medicine (now College of Veterinary

Table 1 Summary of history and evolution of environmental health training and practice in Uganda.

Year	History and evolution of Environmental Health training and practice
1910	Appointment of a special Sanitary Medical Officer to supervise sanitation in the townships of Entebbe, Kampala, Mbale, Mbarara, Hoima and Jinja. The Officer, Dr. J.C. Baker later appointed sanitation committees, one for each township.
1913	The first European Sanitary Inspector, Mr. Mackenzie, was employed for Kampala Township. He is considered the father of Environmental Health in Uganda. In the same year, 16 Plague Inspectors were appointed.
1928	Dr. G. R. H. Chell, then deputy Director of Sanitation observed the death of 32,078 people due to plague and recommended the appointment of more Sanitary Inspectors to handle village sanitation.
1930	More Sanitary Inspectors trained to handle sanitation and recommendation made for training of native helpers to maintain cleanliness around homes.
1934	Health Overseers trained in Teso and Busoga regions who changed rural sanitation drastically.
1935	A European Sanitary Inspector, Mr. H. Jordan, was appointed to be instructor of hygiene and train Africans in the duty of health inspection. He enrolled 12 students some of whom were overseers.
1936	Formal training for Environmental Health practitioners began in Mulago for a 3 year highly specialized course qualifying them as Sanitary Inspectors holding a certificate of the Royal Sanitary Institute.
1946	Ex-Service men trained as Hygiene Orderlies to support African Sanitary Inspectors in their work and due to their role in home improvement, they were referred to as Nuisance Inspectors. Training was initially for 15 months but with more responsibilities, it was later expanded to 2 years. These are the current Health Assistants.
1949	School of Hygiene was transferred from Mulago to Mbale and then housed in the School of Medical Assistants, currently School of Clinical Officers.
1958	Mbale School of Hygiene was constructed to consolidate efforts of training cadres specialized in preventive health services to certificate (Health Assistant) and diploma levels (Health Inspectors).
1959	Mbale School of Hygiene was only used to upgrade the HI (EA) practitioners who were referred to as Extensioners to HI (overseas) until 1964.
1965	Mbale School of Hygiene started full time training for the RSH Diploma for direct entrants and first lot of students completed in 1967. Only 10 students were trained per year until 1969 when 17 students were admitted. Examination was by University of East Africa (now Makerere University) but award by RSH.
1978	Joint training for the EA Environmental Health practitioners ends and universities in the individual countries within the region took over examination of students and award of qualification.
2000	The Bachelors program in Environmental Health Science is introduced at Makerere University to train Environmental Health Officers. This program is hosted at Makerere University School of Public Health.
2008	The Ministry of Education and Sports scrapped the affiliation between Makerere University and Mbale School of Hygiene and UAHEB was created to examine students.

Medicine, Animal Husbandry and Biosecurity) and Medicine (now College of Health Science) specifically Institute of Public Health (now School of Public Health). Later, Kyambogo Polytechnic (now Kyambogo University) and Makerere University Faculty of Technology (now College of Engineering, Design, Art and Technology) joined the management board. Although training continued at Mbale School of Hygiene, the Diploma in Environmental Health was awarded by Makerere University from 1978. In 1995, the program name was not well known within the country which prompted the inclusion of 'Health Inspector' on the qualification to read 'Diploma in Environmental Health (Health Inspector). At first, only males were trained until later when training opportunities were opened to females.

Bachelor of environmental health science at Makerere University

In 2000, Bachelor of Environmental Health Science was introduced at Makerere University as a 3-year program hosted at Makerere University Institute of Public Health. The University was at the same time still overseeing the 3-year diploma program, which was irregular as two programs at different levels (diploma and bachelor's degree) were of the same duration. A

proposal to restructure the diploma program to 2 years under a semester system was mooted and quickly adopted with the idea that the Certificate at Mbale School of Hygiene would be scaled down to 1 year. Later in 2008, the Ministry of Education and Sports scrapped the affiliation between Mbale School of Hygiene and Makerere University citing the high cost of the program and absence of a formal arrangement between the University and the School (earlier arrangement was by presidential directive). The Ministry of Education and Sports under the Business, Technical, Vocational Education and Training Act, 2008, thus set up Uganda Allied Health Examinations Board (UAHEB) to take charge of all examinations of allied health training institutions including certificate and diploma in Environmental Health Sciences. Table 1 summarizes the history and evolution of Environmental Health training and practice in Uganda.

Currently environmental health science training in the country is offered at three levels: certificate, diploma and bachelor's degree. Certificate and Diploma training is offered by Mbale School of Hygiene and Uganda Institute of Allied Health and Management Sciences – formerly Mulago Paramedical School. The first intake of Bachelor of Environmental Health Science students at Makerere University had 12 students. The number of students has gradually increased

over the years and currently ~40 Environmental Health Officers graduate each year. To date, over 450 Environmental Health Officers have graduated from Makerere University since the program began. At the moment, only three institutions, two public and one private, offer Environmental Health training at Bachelor's level in the country.

Current practice

In the past, health assistants were deployed at sub county level and Health Inspectors at county (constituency) and district levels. Presently, the deployment is at parish and sub county levels respectively. Districts in Uganda are divided into counties which are composed of subcounties made up of parishes. A number of villages make up a parish. Health Assistants and Inspectors play important roles in sanitation promotion, community mobilization and sensitization, control of vectors and vermin, promotion of water and food safety, control of environmental pollution, disease surveillance and outbreak investigation and enforcement of legislation. In addition to these roles, health inspectors play a supervisory role over activities of health assistants. Bachelor's degree holders are called environmental health officers (EHOs) and are mainly stationed at district level.

In addition to their involvement in Environmental Health practice at community level, some EHOs manage environmental health service delivery at districts as assistant district health officers in charge of environmental health. This position became available in 2005 following introduction of undergraduate training for environmental health professionals in 2000. The undergraduate program contributed to widening the scope of Environmental Health opportunities. Indeed, currently environmental health practitioners take on various roles in different institutions such as in research centers, consultancy firms and nongovernmental organization. Although Environmental Health practice has widened to include occupational safety and health, program administration, monitoring and evaluation, and research, areas such as food safety, toxicology, pollution and housing have not yet received deserving attention.

Research

The high prevalence of malaria, helminthes and other diseases in Uganda in the early 1930s, led to Environmental Health research which has continued to evolve with several health challenges experienced in

the country. For example, water, sanitation and hygiene (WASH) having been a significant challenge over the past decade has been a subject for most research in Uganda covering aspects of water supply, waste management and handwashing carried out mainly in peri-urban settlements. Some research has also been done in air quality, food safety, vector control and occupational safety and health. With the introduction of undergraduate training, the Environmental Health research profile widened especially in WASH, food safety and hygiene, malaria prevention and control, and occupational safety and health.

Environmental Health research has to some extent led to change in policy and practice in Uganda. For instance, the Kampala Declaration on Sanitation of 1997, which was a result of a national sanitation survey significantly contributed to an increment in the country's latrine coverage.²² WASH innovations have also been implemented, for example the Tippy-tap technology, a simple handwashing device for handwashing with running water, used especially in rural households and schools has improved handwashing facility coverage as well as hand hygiene practices.²³

Governance, policy and legal framework

Governance, structure and regulation

In the ministry of health, environmental health services are coordinated by the Environmental Health division (previously, Health Inspectorate headed by a Chief Health Inspector). Following the decentralization policy in Uganda in 1997, restructuring in the government ministries and departments elevated the office of the Chief Health Inspector to Assistant Commissioner of Health Services in charge of Environmental Health. In 2017, the division was elevated to a Department headed by a Commissioner in charge of Environmental Health starting July 2018. The Allied Health Professionals Council regulates Environmental Health practice and that of para-medical professionals on behalf of the Ministry of Health.

Environmental Health practitioners are brought together under the Environmental Health Workers' Association of Uganda (EHWAU) which evolved in 2000 from the Public Health Inspectors Association of Uganda that used to admit only Health Inspectors. EHWAU targets Environmental Health practitioners at all levels of training (Health Assistants, Health Inspectors and Environmental Health Officers) and is a member of the International Federation of Environmental Health (IFEH) since 2003. IFEH is an

organization of national associations representing interests of environmental health professionals throughout the world. Although EHWAU is the professional association, most advocacy for Environmental Health reforms within the country including in public service have been spearheaded by Makerere University Environmental Health Students' Association (MUEHSA). Notably, MUEHSA led efforts for the creation of the Assistant District Health Officer position in the local government structure in 2005. MUEHSA is a body of students of Environmental Health Science at Makerere University formed in 2003 by the first cohort of students to mobilize and advocate for issues that affect them and the profession. Over the years, MUEHSA has engaged in several activities to promote the Environmental Health profile in Uganda including holding public exhibitions and involvement in community development programs such as sanitation and hygiene promotion. MUEHSA has also led the World Environmental Health Day celebrations in the country and actively participates in commemoration of other important days such as the World Handwashing Day.

In addition to supporting continuing professional development through seminars, and other appropriate educational fora, MUEHSA organizes annual conferences to discuss Environmental Health matters and provide an avenue for students, professionals and other stakeholders to share their experiences and research findings. MUEHSA's 16th Annual Conference will be held together with the third IFEH Academic Conference in April, 2019 in Kampala, Uganda. This conference, which will be the first IFEH academic conference to be held in Africa, is expected to be attended by participants from all the five regions of the IFEH (Africa, Americas, European, Asia and Pacific, and Middle East).

Policies and guidelines

Uganda drafted its first national Environmental Health policy in 2005 which established the Environmental Health priorities of the country as: water supply; sanitation and hygiene promotion; solid, liquid, hazardous; and health care waste management; air pollution control; food safety and hygiene; control of insect vectors and vermin; occupational safety and health; and road safety and housing conditions. The policy was in line with the national health policy²⁴ and provided a framework for development of services and programs at national and local levels.²⁵ The policy highlighted that the Environmental Health status was

poor and contributed to a high burden of environmental-related diseases with over 75% of premature deaths due to preventable causes. The Environmental Health policy was preceded by the National Sanitation policy (named the Kampala Declaration on Sanitation) first drafted in 1997 which defined the country's policy and approach to sanitation²⁶ and endorsed the guiding principle to halt the declining sanitation status in the country.

Other general health policies and plans within the country also emphasize the relevance of Environmental Health in achieving the country's goals. The Health Sector Strategic Investment Plan states that "the improvement of environmental health aims at contributing to the reduction of morbidity, mortality and disability among the people of Uganda through improvements in housing, safe water, food hygiene, waste management and control of vector and vermin". The country is currently working towards achievement of Vision 2040 whose goal is to have a healthy and productive population to which Environmental Health has a great contribution. In 2018, an Environmental Health Strategic Plan was developed to address priority areas in line with the Health Sector Development Plan (2018/19 – 2022/23). The priority areas are: capacity building, policy formulation, improved institutional framework of coordination, collaboration, partnerships as well as support to knowledge management and advocacy for Environmental Health services at all levels.²⁷

Legal framework

Environmental Health laws date back to 1935 and 1936, a period when most laws in the country were enacted. After Uganda got its independence in 1962, all laws were subsequently updated in 1964 and later in 2000 when the Government set up a Law Reform Commission to review and revise all laws. The 1995 Constitution of the Republic of Uganda provides every Ugandan with the right to a clean and healthy environment. The major law that applies to Environmental Health practice is the Public Health Act, 2000 Chapter 281 of the laws of Uganda and its subsidiary legislations. The law was first enacted on 15 October 1935 as the British Public Health Act but after independence, it was found inconsistent with some basic requirements of a sovereign country which led to the repeal of some sections. Thus in 1964, a new law was enacted to consolidate preservation of public health in Uganda as Chapter 269 which was revised in 2000 to become the Public Health Act, Chapter 281. This

review of the Act did not change the content of the law but majorly updated the language and removed sections that were no longer applicable. Efforts are currently underway to fully review the premise of the law to update it to deal with current environmental and public health challenges. The key sections of the Public Health Act for Environmental Health practice include 56 to 61 which describe the duty of local authorities to prevent and remedy danger to health arising from unsuitable dwellings, defines nuisances, author of nuisance and lays down procedures for their abatement. The subsidiary legislations cover several Environmental Health areas including drainage and sanitation, building, schools and food (meat, milk, and bread).

Other laws that contribute to Environmental Health practice in Uganda include those specific to occupational safety and health such as the Occupational Safety and Health Act, 2006, the Employment Act, 2000, and the Workers Compensation Act, 2000. Moreover, Environmental Health being multidisciplinary, there are additional laws from other sectors that are of Environmental Health importance such as: National Environment Act, 1995 and the regulations made thereunder; Noise Standards and Control Regulations, 2003; Environmental Impact Assessment Regulations, 1998; Physical Planning Act, 2010; and the Local Governments Act, 1997.

Challenges

Since its early days, the Environmental Health profession in Uganda has faced several challenges in practice, training, research and overall policy development and implementation. The challenges include: political instability, historical gaps in Environmental Health training, lack of prioritization of Environmental Health, weak professional association, limited awareness of the profession, poor coordination with other agencies, and gaps in the legal framework.

Political instability

Uganda has gone through some political turmoil in the past which greatly affected the Environmental Health profession. By the late 1960s, the numbers of trained professionals had increased and changed the trend of preventable diseases to manageable levels through highly Government supported sanitation concentration areas, village and home improvement campaigns. Following breakdown of law and order in the

1970 and 1980s, the Environmental Health profession which was performing well at the time was hugely affected. In fact, the country faced the largest ever drop in latrine coverage to 30% in 1980 and the profession has since then struggled to recover its previous position.

Historical gaps in environmental health training

Although the Diploma program in Environmental Health was introduced in 1936, it was not until 2000 that a Bachelor's program came into existence. This gap in Environmental Health training created historical drawbacks denying most Diploma holders opportunities to upgrade their training and affected their subsequent recognition within existing structures. Through the process, many Health Inspectors ended up studying other nonrelated programs and some have abandoned the profession. This made the Environmental Health profession lag behind other health professions.

Despite some progress, Uganda still faces major challenges in advancing environmental health training. The country has no graduate (Master's and PhD levels) or professional courses/training programs for Environmental Health which would advance the profession and prepare the next generation of scientists/researchers. There is also lack of Environmental Health laboratories which are adequately equipped, and institutes/centers that can advance training and research in the country. Consequently, little focus has been given to complex Environmental Health issues such as pollution, toxicology, risk assessments which also contribute to the environmental burden of disease.^{16,29}

Lack of prioritization of environmental health

During planning, the government of Uganda has historically prioritized curative services with little focus on prevention even with the acknowledgement that the most diseases affecting the country are preventable. With historical gaps in training, the participation of Environmental Health practitioners in key decision-making processes including planning, and resource allocation both at the Ministry of Health and the decentralized units of government was limited. For example, at district level, all heads of department were for a long time graduates except the Health Inspector, and in critical matters such as budgeting and prioritization, Environmental Health matters were inadequately considered. The scope of

practice was thus limited, creating an impression that Environmental Health was more about sanitation than other aspects such as pollution.

Weak professional association

Historically, there has been inadequate advocacy and lobbying for Environmental Health, a role that should be played by the professional association (EHWAU). The professional association has been inactive in advocating for the Environmental Health matters due to challenges in mobilizing and coordinating practitioners and other resources.

Limited awareness of the profession

Although the Environmental Health profession is one of the oldest and previously highly regarded, its recognition has gradually reduced, for example several stakeholders including employers do not fully understand the environmental health profession and its roles. This has led to many of employers providing opportunities to nonenvironmental health professionals thereby reducing employment avenues for practitioners. Consequently, there is slow growth of opportunities within other sectors such as nongovernmental organizations and consultancy firms confining most Environmental Health professionals to the public service sector. Having noncompetent professionals handle Environmental Health matters affects practice and desired impact.

Poor coordination with other agencies

Environmental health being multifaceted requires contributions from other sectors such as planning, engineering, legal and environment to effectively implement policies and regulations. Unfortunately, the uncoordinated efforts among stakeholders such as across the different government ministries, local authorities and enforcement agencies has affected proper planning, prioritization and achievement of Environmental Health goals.

Gaps in the legal framework

The current environmental health regulatory framework has gaps which have affected the Environmental Health policy implementation, enforcement and practice. For instance, the Public Health Act, 2000 and the environmental health policy, 2005 are regarded as outdated and not able to meet the current environmental

health needs of the country given the increasing urbanization, pollution and industrialization. In addition, current Environmental Health laws have unclear offenses and insufficient penalties. There are also several delays in prosecution of offenders amidst bureaucratic procedures. The governance and accountability systems are also flawed and practice is affected by political interference.²⁸

The future of environmental health

From its inception to date, Environmental Health has evolved in various ways in aspects of training and research, practice, and governance, policy and legal framework. Given this, we envision the future of Environmental Health in Uganda along these key themes.

Training and research

Considering capacity gaps in training and research, it is important that opportunities for advanced and more specialized training in Environmental Health are created to produce a workforce with capability to address the current and future Environmental Health concerns. Comprehensive efforts to advance Environmental Health training in the country should include focused programs at Masters and PhD levels. The advanced training will be central in creating professionals who will engage in research in various Environmental Health areas to inform policy and evidence-based practice. The scope of Environmental Health research within the country will also expand to cover broader areas including modern hazards like heavy metals and pesticides.²⁹ In fact, the role of Environmental Health in other key emerging areas such as climate change, One Health, sustainable development, noncommunicable diseases and antimicrobial resistance will further be explored. This will also contribute to more visibility and impact of Environmental Health in disease prevention and control within the country.

To achieve this transformation in training and research, it is key to create the prerequisite infrastructure such as specialized Environmental Health laboratories and demonstration sites. Among current efforts, Makerere University School of Public Health has finalized a curriculum for a Master of Environmental and Occupational Health awaiting university approval. Besides advanced training, professional courses in various areas of Environmental Health are vital in building the capacity of

practitioners thus creating opportunities for continuous professional development.

Practice

The expanded training and research will influence environmental health practice in multiple ways. Clearly, the scope of practice will be broader to encompass the other Environmental Health areas that have not received desired attention. The environmental health field in Uganda will also evolve from generalized into more specialized practice within key areas. With the increasing mass of qualifying professionals, the current shift from practice in public service to wider sectors such as research institutions and nongovernmental organizations will increase. Also, environmental health private practice which has been minimal will proliferate with establishment of firms providing various services such as inspection, waste management and environmental risk and impact assessments.

The recognition of the profession and its contribution to public health will continue especially with involvement in many cross-cutting fields. More so, as countries continue to recognize the importance of multidisciplinary approach to health, it is important that Environmental Health professionals position themselves to take advantage of subsequent opportunities and collaborations. In tandem with other fields, Environmental Health practice in Uganda will embrace advancement in technology for example in real time monitoring of Environmental Health risks using mobile devices.

Governance, policy and legal framework

Governance is important for creating an enabling environment by building supportive systems, collaborations and partnerships that oversee Environmental Health training, research and practice in the country. The widening scope of Environmental Health practice will require comprehensive national efforts to develop policies and appropriate legal framework that govern Environmental Health services delivery and stakeholder engagement. Relatedly, there is need for increased funding for Environmental Health activities such as research. It will also be critical that Environmental Health matters are streamlined across all sectors and levels of governance. This should include establishment of an independent council for professionals or the strengthening of the existing one

to regulate, supervise and control Environmental Health training, practice and related matters.

Given the central role of the association (EHWAU) in advancing the profession, it should have a strengthened system with programs and strategies that adequately advocate and support interests of Environmental Health practitioners. There is also a need to restructure Environmental Health administration at the district and lower local governments where historically, medical officers who do not have Environmental Health competencies oversee the work of Environmental Health practitioners. The Environmental Health office should be repositioned to enable efficient and effective services delivery and technical oversight.

Conclusion

Environmental Health in Uganda has experienced growth and evolved in significant ways since its inception. However, major gaps in Environmental Health training, practice, research, and governance, policy and legal framework have impeded progress in the field. With concerted efforts to bridge identified gaps, Environmental Health will continue to evolve. We anticipate increased opportunities in training such as advanced and more specialized Environmental Health programs which will sprout into cutting-edge research and improved practice. The areas of training, research and practice will broaden to cover areas that have previously received less attention and cross cutting fields. The need to develop favorable infrastructure including specialized Environmental Health laboratories and demonstration sites cannot be over emphasized. The shift from mainly practice in public service to other sectors such as nongovernmental organization and private companies will continue. In terms of governance, comprehensive national efforts should be geared to develop policies and supportive legal framework to govern Environmental Health services. This will translate into wider recognition and sustainable impact of Environmental Health and its relevance in safeguarding and promoting health.

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References

- Kotchian S. Perspectives on the place of environmental health and protection in public health and public health agencies. *Annu Rev Public Health*. 1997;18(1):245–259.
- Roper WL, Baker EL, Jr, Dyal WW, Nicola RM. Strengthening the public health system. *Public Health Rep*. 1992;107(6):609
- WHO. *Environmental Health 2018*; http://www.searo.who.int/topics/environmental_health/en/. Accessed 28th March 2018.
- Gordon L, Davis T, Powitz R. The future of environmental health: part one. *J Environ Health*. 1993;55(4):38–50.
- Marshall L, Weir E, Abelsohn A, Sanborn MD. Identifying and managing adverse environmental health effects: 1. Taking an exposure history. *Can Med Assoc J*. 2002;166(8):1049–1055.
- Robertson LW, Hansen LG. *PCBs: Recent Advances in Environmental Toxicology and Health Effects*. University Press of Kentucky; Lexington, KY, 2015.
- Gavrilescu M, Demnerová K, Aamand J, Agathos S, Fava F. Emerging pollutants in the environment: present and future challenges in biomonitoring, ecological risks and bioremediation. *New Biotechnol*. 2015;32(1):147–156.
- Forouzanfar MH, Afshin A, Alexander LT, et al. Global, regional, and national comparative risk assessment of 79 behavioural, environmental and occupational, and metabolic risks or clusters of risks, 1990–2015: a systematic analysis for the Global Burden of Disease Study 2015. *Lancet*. 2016;388(10053):1659–1724.
- Kavlock RJ, Daston GP, DeRosa C, et al. Research needs for the risk assessment of health and environmental effects of endocrine disruptors: a report of the US EPA-sponsored workshop. *Environmental Health Perspect*. 1996;104(Suppl 4):715.
- Wu S, Powers S, Zhu W, Hannun YA. Substantial contribution of extrinsic risk factors to cancer development. *Nature* 2016;529(7584):43.
- Bishehsari F, Mahdavinia M, Vacca M, Malekzadeh R, Mariani CR. Epidemiological transition of colorectal cancer in developing countries: environmental factors, molecular pathways, and opportunities for prevention. *World J Gastroenterol*. 2014;20(20):6055.
- Mlombe Y, Rosenberg N, Wolf L, et al. Environmental risk factors for oesophageal cancer in Malawi: a case-control study. *Mal Med J*. 2015;27(3):88–92.
- Cosselman KE, Navas-Acien A, Kaufman JD. Environmental factors in cardiovascular disease. *Nat Rev Cardiol*. 2015;12(11):627.
- Münzel T, Sørensen M, Gori T, et al. Environmental stressors and cardio-metabolic disease: part I—epidemiologic evidence supporting a role for noise and air pollution and effects of mitigation strategies. *Eur Heart J* 2017;38(8):550–556.
- United Nations. *Transforming Our World: The 2030 Agenda for Sustainable Development*. 2015; <https://sustainabledevelopment.un.org/post2015/transformingourworld>. 1.
- Prüss-Ustün A, Wolf J, Corvalán C, Neville T, Bos R, Neira M. Diseases due to unhealthy environments: an updated estimate of the global burden of disease attributable to environmental determinants of health. *J Public Health*. 2017;39(3):464–475.
- Plume R, Page A. *Evolving Models of Environmental Health Service Delivery: A Real-Time Experiment?* In: Chartered Institute of Environmental Health: 115th Annual Conference: Health for our Future, 20–21 Oct 2015, Nottingham.
- Nel AE, Parak WJ, Chan WC, et al. *Where Are We Heading in Nanotechnology Environmental Health and Safety and Materials Characterization?* ACS Publications; 2015.
- Haugen AC, Schug TT, Collman G, Heindel JJ. Evolution of DOHaD: the impact of environmental health sciences. *J Dev Orig Health Dis*. 2015;6(02):55–64.
- Hoberg EP, Brooks DR. Evolution in action: climate change, biodiversity dynamics and emerging infectious disease. *Phil Trans R Soc B*. 2015;370(1665):20130553.
- James TY, Toledo LF, Rödder D, et al. Disentangling host, pathogen, and environmental determinants of a recently emerged wildlife disease: lessons from the first 15 years of amphibian chytridiomycosis research. *Ecol Evol*. 2015;5(18):4079–4097.
- Ministry of Health. *Environmental Health 2018*; <http://health.go.ug/community-health-departments/environmental-health>. Accessed 25th April 2018.
- Biran A. *Enabling Technologies for Handwashing with Soap: A Case Study on the Tippy-Tap in Uganda*. London: Water and Sanitation Programme; 2011.
- Government of Uganda. National health policy. In: *Health Mo*, ed. Kampala, Uganda; 1999.
- Ministry of Health. National environmental health policy. In: *Health E*, ed. Kampala, Uganda; 2005.
- Government of Uganda. The Kampala declaration on sanitation. In: *Health E*, ed. Kampala, Uganda; 1997.
- Ministry of Health. *Environmental Health Strategic Plan 2018/19 - 2022/* 2018;23.
- Atusingwize E, Musinguzi G, Ndejjo R, et al. Occupational safety and health regulations and implementation challenges in Uganda. *Arch Environ Occup Health*. 2018;1–8. doi: 10.1080/19338244.2018.1492895.
- Nweke OC, Sanders III WH. Modern environmental health hazards: a public health issue of increasing significance in Africa. *Environ Health Perspect*. 2009;117(6):863.