Strategic Trade-offs between Graduate and Undergraduate Public-Health E-Learning in Africa: A Multinational Mixed-Methods Analysis

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DOI: https://doi.org/10.51244/IJRSI.2025.1215000106P

Received: 04 July 2025; Accepted: 11 July 2025; Published: 08 August 2025

ABSTRACT

(1) Purpose – Sub-Saharan Africa faces a projected shortfall of 5.3–6.1 million health workers by 2030, yet locally accessible graduate programmes remain scarce. This study evaluates whether a fully online, pan-African Master of Public Health (MPH) offers greater strategic value than a traditional, three-year Bachelor of Public Health (BPH) in closing advanced workforce gaps. (2) **Design/methodology/approach** – We adopted a mixed-methods design that triangulates (i) an integrative synthesis of secondary datasets from WHO, Africa CDC, UNESCO and national statistics; (ii) competitive landscape mapping of accredited BPH/MPH programmes in ten priority markets (Rwanda, Nigeria, South Africa, Kenya, Ethiopia, Uganda, Ghana, Tanzania, Democratic Republic of Congo and Zambia); (iii) deterministic cost-benefit modelling for an 18-month online MPH versus a three-year online BPH; and (iv) curriculum–competency alignment using content analysis and natural-language processing against WHO Essential Public-Health Functions and Africa CDC frameworks. (3) **Findings** – The potential applicant pool for an online MPH among practising health professionals is conservatively five-to-ten times larger than the undergraduate market for a BPH. Critical roles—epidemiology, health-policy analysis and biostatistics—require master's-level competencies that a BPH cannot supply. Fewer than 10 locally accredited online MPH options exist continent-wide, revealing a pronounced market gap. Financial projections show the online MPH breaks even with ~35 learners per cohort and yields a 22 % internal rate of return under conservative tuition scenarios, outperforming the BPH on every profitability metric. Strategically, the MPH aligns with Africa CDC's "New Public Health Order" and national workforce plans, positioning universities for reputational and partnership gains. Recent African Union commitments to the Health-Workforce Social Compact underscore the urgency: the continent must create or up-skill at least 1.9 million health professionals by 2030 to avert a projected global shortfall of 11 million workers, most of it concentrated in low-income regions. (4) **Originality/value** – This is the first multi-country desk analysis to juxtapose market demand, competency needs and financial feasibility of an online MPH against an online BPH in Africa. (5) **Practical implications** – Findings furnish universities, ministries and development partners with an evidence-based roadmap for scaling competency-driven online graduate training as a catalyst for resilient African health systems.

Keywords: Online MPH, Africa, health workforce development, public health education, feasibility study, competency-based curriculum, higher education policy

INTRODUCTION

Sub-Saharan Africa faces an intensifying public health crisis rooted not only in disease burden but in the region's chronic shortage of trained professionals. Despite accounting for nearly 25% of the global disease burden, Africa is home to only about 3% of the world's health workforce (Kabbash et al., 2021). This structural imbalance severely constrains the continent's ability to deliver adequate healthcare and respond effectively to public health emergencies. Projections from the World Health Organization (WHO) suggest that Africa will confront a

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI | Volume XII Issue XV July 2025 | Special Issue on Public Health

shortage of approximately 5.3 to 6.1 million health workers by 2030 (CNNTD, 2024; WHO AFRO, 2022), threatening the continent's progress toward Sustainable Development Goal 3 and the global push for universal health coverage (WHO, 2024). The Canadian Network for Neglected Tropical Diseases warns that this gap will leave "entire communities living with—and dying from—preventable NTDs" if not urgently addressed (CNNTD, 2024). The WHO's minimum threshold for adequate health coverage is 4.45 doctors, nurses, and midwives per 1,000 people (WHO, 2016), but the average density in the African Region remains at just 1.55 (Osabutey & Jackson, 2024). Only four countries—Mauritius, Namibia, Seychelles, and South Africa—currently exceed this benchmark (WHO Global Health Observatory, 2024), while most others continue to lag far behind. Recent WHO analysis cautions that these shortages already "stifle Africa's health systems," with average densities stuck at 1.55 health workers per 1 000 people (WHO AFRO, 2022)

These deficits extend beyond clinical providers to include critical public health roles such as epidemiologists, health policy analysts, health educators, and program managers. For example, according to the Africa Centres for Disease Control and Prevention (Africa CDC), as of 2020, the entire continent had only 1,400 field epidemiologists—far below the estimated minimum need of 6,000—highlighting a critical shortfall in outbreak response capacity (Africa CDC, 2020). The COVID-19 pandemic made the consequences of this gap painfully clear, revealing weaknesses in disease surveillance, outbreak management, and public communication across the continent (WHO AFRO, 2021). As Nkengasong emphasized, without a strategic shift to develop homegrown expertise, Africa will continue to struggle to manage its own public health agenda (Nkengasong & Tessema, 2020).

At the root of this workforce gap lies a deeper structural issue: Africa's higher education systems are not currently equipped to train public health professionals at the scale or speed required. With a gross tertiary enrollment ratio of only 9% to 10%, the region trails far behind the global average of approximately 40% (Gangwar & Malee Bassett, 2021; Sangwa et al., 2025). In absolute terms, only around 9 million students are enrolled in sub-Saharan Africa's higher education institutions—about 3–4% of the region's college-age population—reflecting a confluence of limited university capacity, high costs, and geographical inaccessibility (Gangwar & Malee Bassett, 2021; World Bank, 2020). The result is a narrow pipeline for advanced public health training, even as regional demand surges in the wake of recurring epidemics and health system reforms.

Traditional campus-based training pathways, such as three-year Bachelor of Public Health (BPH) programs and two-year Master of Public Health (MPH) degrees, are struggling to keep pace. As Africa CDC Director John Nkengasong observed, "the pandemic is a wake-up call to build public health capacity locally, not rely on imported expertise" (Harvard, 2020) —underscoring the urgency of local graduate training pathways. Many African MPH programs face faculty shortages, limited resources, and high dropout rates. In South Africa, for instance, a nationwide review revealed that most MPH programs experience delayed graduations and low throughput, resulting in small numbers of graduates entering the workforce each year (Seme et al., 2019). These systemic bottlenecks are compounded by geographic disparities in program access, especially in low-income and post-conflict countries. Health professionals in such contexts often lack viable local training options and must choose between emigrating for studies or foregoing advanced training altogether. The resulting brain drain has been both costly and persistent: between 2010 and 2018, nine African countries lost approximately $2 billion worth of medical training investments due to outward migration of graduates (Tankwanchi et al., 2020). A 2021 survey of Egyptian medical trainees found 62 % already intend to work abroad, citing inadequate career progression and pay (Kabbash et al., 2021).

To address these barriers, governments and health organizations are increasingly advocating for more innovative, scalable, and context-sensitive approaches to public health education. Among these, online and blended learning models are gaining traction (Sangwa et al., 2025). The WHO's Africa office and Africa CDC have both emphasized the transformative potential of digital learning platforms to expand access, accelerate training, and reduce costs (WHO, 2020; Africa CDC, 2020).WHO's April 2020 cross-border webinar series for COVID-19 responders—attended by more than 25 000 participants from over 20 African countries—was hailed by the agency as "the way forward" for rapid capacity-building (WHO AFRO, 2020), demonstrating the continent's capacity to scale cross-border e-learning for frontline staff. The University of Pretoria and University of Rwanda have both launched digital graduate programs since 2020 (University of Pretoria, 2024; Sangwa et al., 2025), suggesting local readiness for online postgraduate health education. Online delivery is particularly well-suited to reach mid-career professionals and practitioners who cannot relocate for full-time study (Booysen, 2022).

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI | Volume XII Issue XV July 2025 | Special Issue on Public Health

Recognizing this, Africa CDC launched its "New Public Health Order" in 2021, which prioritizes workforce development through flexible, competency-based training (Nkengasong & Tessema, 2020). The strategy includes support for the Africa CDC Institute for Workforce Development and calls for expanding graduate-level training in epidemiology, health informatics, and program leadership, including through online modalities.

Parallel efforts at the national level are also gaining momentum. Rwanda's National Strategy for Health Professions Development 2020–2030 explicitly prioritizes postgraduate training (MoH Rwanda, 2020) to meet national health goals. The Government of Rwanda has emphasized advanced training as part of its Human Resources for Health (HRH) strategy, echoing broader continental trends (MoH Rwanda, 2020). This aligns with continental blueprints such as the African Union's Agenda 2063 (Sangwa & Murungu, 2025) and Africa CDC's New Public Health Order, which both position health workforce development as central to solving the continent's grand challenges (Nkengasong & Tessema, 2020). These strategic plans reflect a growing policy consensus: conventional educational models alone cannot meet Africa's urgent need for a robust, resilient, and contextually grounded public health workforce. Instead, scalable online graduate programs—such as a Master of Public Health designed for working professionals—offer a promising avenue for transformative impact.

Yet workforce calculations must now contend with cascading climate shocks that expand the range of infectious, zoonotic and nutrition-related diseases. WHO lists climate change among the top ten threats to global health, and the Africa CDC's April 2025 strategy explicitly links workforce resilience to 'One-Health' surveillance across human, animal and environmental interfaces (Africa CDC, 2025). Embedding an ecological intelligence thread throughout the MPH curriculum therefore transforms the programme from a narrow skills pipeline into a systemic resilience intervention.

The rationale for this research, therefore, emerges from the convergence of three critical forces: an escalating public health workforce crisis; the inadequacy of traditional education models; and a policy environment increasingly receptive to digital innovation in higher education. This study seeks to evaluate whether launching an online, pan-African Master of Public Health (MPH) program would be a feasible, impactful, and financially sound solution for addressing Africa's public health training gap. It explores market demand, curriculum adequacy, cost-benefit considerations, and strategic institutional alignment, using Rwanda and other populous African nations—such as Nigeria, Kenya, South Africa, Uganda, Ghana, Tanzania, Ethiopia, DRC, and Zambia—as core reference markets.

In doing so, this research positions itself at the intersection of global health policy, digital education, and African development.Drawing on Rogers' Diffusion-of-Innovation and Pfeffer & Salancik's Resource-Dependence perspectives, we conceptualise programme adoption as both a contagion of ideas and a quest for legitimacy. By drawing on real-world data, current policy frameworks, and strategic insights from leading health institutions, the study contributes not only to academic scholarship but also to practical decision-making for universities, governments, donors, and public health actors working to build Africa's next generation of health leaders.

Problem Statement: Despite increasing recognition of Africa's public health workforce crisis, and growing interest in online education as a solution, there remains a significant gap between policy ambitions and actionable, evidence-based educational models. Bachelor of Public Health (BPH) programs—though increasingly available—often produce entry-level generalists who lack the advanced analytical and leadership skills (Seme et al., 2019) required to address complex challenges such as health policy design, epidemic response, and data-driven decision-making (ACDCP, 2020; WHO, 2020). Master's-level training is crucial for filling these critical roles, yet traditional on-campus MPH programs across Africa are limited in capacity, geographically concentrated, and often inaccessible to working professionals (Seme et al., 2019). Moreover, many existing curricula are misaligned with Africa-specific health needs and lack integration with WHO and Africa CDC competency frameworks (WHO, 2024).

At the same time, while online MPH programs exist globally, they are predominantly offered by institutions in high-income countries, with limited relevance to African contexts and scarce evidence of local impact (Tankwanchi et al., 2020). There is insufficient empirical research on whether a locally designed, fully online MPH—grounded in African public health realities—can effectively bridge the workforce gap, serve the needs of professionals across diverse markets, and offer institutional sustainability. This study therefore investigates the feasibility, comparative value, and strategic fit of launching such a program, positioning it as a potentially

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI | Volume XII Issue XV July 2025 | Special Issue on Public Health

scalable intervention at the intersection of digital education and health systems strengthening.

The general objective of this research is to evaluate the feasibility and strategic value of launching a pan-African online Master of Public Health program as a means of expanding the advanced public health workforce. In particular, the study compares an online MPH (as a postgraduate offering) with a conventional Bachelor of Public Health (BPH) pathway, to determine which approach more effectively addresses market demand, workforce needs, and institutional goals. By doing so, we aim to provide evidence-based guidance to universities and policymakers considering investments in online public health education.

To achieve the general objective, several **specific objectives** are pursued: (1) **Market-size assessment** – quantify and compare the pool of potential students for an online MPH (practicing health professionals with bachelor's degrees) versus an online BPH (recent secondary school graduates) in Rwanda and selected African markets; (2) **Workforce-need alignment** – identify current and projected public health workforce shortages in target countries and distinguish which roles require master's-level training as opposed to bachelor-level skills; (3) **Program-supply landscape** – catalogue existing BPH and MPH programs (on-campus, hybrid, and online) available to African learners, noting gaps in geography, cost, and delivery mode; (4) **Economic and institutional viability** – compare the cost of delivering an online MPH versus BPH, along with expected tuition revenue and financial sustainability within the context of an African institution's business model; (5) **Curriculum relevance audit** – evaluate the alignment of the proposed MPH curriculum with essential public health competencies (drawing from WHO, Africa CDC, and national frameworks) and assess its suitability to address pressing regional health challenges; and (6) **Strategic fit analysis** – examine how launching an MPH (versus a BPH) would advance the mission and strategic priorities of the implementing institution and its partners (for example, by contributing to Africa's "grand challenges" in health, strengthening the institution's brand, and supporting pan-African student recruitment goals).

Research Questions and Hypotheses

In line with the above objectives, this study is guided by six key **research questions (RQs)**

RQ1 (Market Demand): What is the current and projected demand among working health professionals for an online MPH in Rwanda and the wider African market, and how does it compare with demand for an online BPH among recent secondary-school graduates? This question investigates the size and characteristics of the target student market for an online MPH, relative to the traditional undergraduate market. We hypothesize that the demand for a graduate-level online MPH (among health workers seeking career advancement) is substantial and likely exceeds the practical demand for an online BPH among school-leavers, given that many health graduates in Africa seek further qualifications for professional growth (Sangwa, 2025). This perception is reinforced by a regional workshop in which mid-career health officers from six African countries cited lack of local MPH options as a major barrier to their professional advancement .

RQ2 (Workforce Gaps and Training Level): Which public health skill gaps in Rwanda and neighboring countries require master's-level training, and which could be met adequately through bachelor-level education? This addresses the differentiation of competencies by training level. We hypothesize that leadership, analytical, and specialist roles (e.g. epidemiology, health policy, biostatistics) predominantly require master's-level preparation, whereas some general implementation roles (e.g. community health officers) might be filled by BPH graduates – implying that an MPH program would target critical high-level skill gaps.

RQ3 (Program Landscape): What accredited BPH and MPH programs (online, hybrid, or on-campus) are presently available to African learners, and where are the geographic, cost, and modality gaps? This question maps the competitive and collaborative landscape of existing programs. We anticipate finding that few fully online MPH options are offered within Africa, creating a market gap often filled by foreign or external programs, and that existing local MPH programs tend to be concentrated in a few countries and major cities, leaving many countries (especially Francophone and low-income nations) underserved.

RQ4 (Financial Viability): How do the cost structures and revenue potentials of an online MPH and an online BPH compare within the institution's financial model? This entails an economic feasibility analysis. We hypothesize that an online MPH can achieve a favorable financial profile (shorter time-to-degree, scalable online delivery, potential for higher tuition per year from working professionals) relative to a longer BPH, thereby

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI | Volume XII Issue XV July 2025 | Special Issue on Public Health

yielding a higher net present value and internal rate of return for the institution. However, we also consider that upfront development costs and technology investments are needed, which we incorporate into scenario analyses.

RQ5 (Strategic Alignment): Which degree option (MPH or BPH) aligns more closely with Rwanda's national health workforce plans, the Africa CDC's continental frameworks, and the institution's strategic pillars (e.g. cost efficiency, market expansion, tackling Africa's Grand Challenges)? This examines the broader policy and strategic fit. We posit that the MPH program will show stronger alignment with high-level strategies – for example, supporting Africa CDC's workforce development goals and Rwanda's health sector strategic plans – as well as with the university's mission to produce Africa's future leaders in solving grand challenges (health being paramount).

RQ6 (Curriculum and Delivery): What curriculum elements (core competencies, practica, partnerships) are essential to ensure graduate employability and impact, and how can they be delivered effectively online? This question addresses program design for quality and relevance. We hypothesize that an online MPH can be designed to meet recognized competency frameworks (e.g. WHO core competencies for public health, Africa CDC guidelines) by using innovative pedagogical approaches – such as virtual simulations for fieldwork, online collaborative projects with local health institutions, and capstone projects addressing real health problems. Ensuring components like an applied practicum or mentorship will be crucial even in an online format to maintain graduate employability.

By investigating these questions, this study aims to provide a comprehensive evidence base to inform whether and how to proceed with launching an online MPH program targeting African markets. The results are intended to guide not only the specific institution in question (in this case, a pan-African university considering the program) but also other stakeholders such as ministries of health and education, international donors, and regional bodies interested in innovative solutions for health workforce development.

LITERATURE REVIEW

Public Health Education Needs in Africa

Africa's public health challenges – from infectious disease outbreaks to rising non-communicable diseases – have created an imperative for skilled public health practitioners. A robust body of literature and policy reports emphasize that strengthening the public health workforce is critical for health system resilience (WHO, 2024). A standalone "Global Health" master's was considered; however, such programmes typically emphasise international diplomacy, trans-border governance and conditions prevalent in high-income settings. Africa CDC's "New Public Health Order" and WHO-AFRO's Essential Public-Health Functions instead prioritise applied epidemiology, health-systems leadership and biostatistics—core domains codified in the MPH tradition. Consequently, an MPH delivers a tighter competency match to Africa's workforce plans and ministry vacancy profiles, whereas a Global-Health curriculum risks misalignment with on-the-ground service delivery needs.

An emergent stream of scholarship argues that Africa's public-health curricula remain tethered to epistemologies developed for high-income contexts, often sidelining indigenous knowledge systems and community-rooted diagnostics (Heller et al., 2019). A decolonial framing re-centres African ontologies of health—such as Ubuntu's relational conception of wellbeing—thereby challenging the transactional logic of workforce 'production' and reframing education as a mutual capacity-building covenant. Positioning the MPH within this epistemic-justice discourse elevates its philosophical depth and aligns it with continental calls to 're-Africanise' health science training.

WHO's roadmap for essential public health functions (EPHF) identifies developing workforce competencies as a top priority for all countries, especially in the context of threats like climate change, pandemics, and antimicrobial resistance (WHO, 2024). In May 2022, WHO and partners outlined a framework aligning education with the skills needed to deliver EPHF, essentially calling on educational institutions to produce graduates with the competencies to perform key public health functions (WHO, 2024). These competencies range from disease surveillance and epidemiological analysis to health promotion, policy development, and emergency management.

In sub-Saharan Africa, the need for such competencies is acute. The health workforce shortage is not only about

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI | Volume XII Issue XV July 2025 | Special Issue on Public Health

doctors and nurses, but also about public health specialists who can lead prevention programs and health campaigns. The Africa CDC's Framework for Public Health Workforce Development (2020–2025) explicitly notes the need for more advanced training programs. Africa CDC convened a task force that recommended "collaborating with African schools of public health to increase the number of Africans with graduate-level training"(ACDCP, 2020). This reflects a recognition that undergraduate training alone cannot meet the demand for highly skilled professionals – a demand further highlighted by the COVID-19 pandemic response. Schools of Public Health (SPH) across Africa have been scaling up training: for example, a 2024 survey of public health doctoral programs in Africa found that over 70% had introduced online teaching, mostly since the emergence of COVID-19 (Bukenya et al., 2024), illustrating a shift toward flexible learning modalities to reach more students. Even at the front-line level, initiatives like WHO-AFRO's online COVID-19 responder training engaged hundreds of participants from multiple countries in real time (WHO AFRO, 2020), proving the viability of cross-border, online capacity building. These developments underscore that online platforms can play a pivotal role in addressing training gaps at scale.

Market Demand: MPH vs BPH in Key African

The target countries for this program – Rwanda, Nigeria, South Africa, Kenya, Ethiopia, Uganda, Ghana, Tanzania, DRC, and Zambia – represent a substantial portion of Africa's population and suffer from significant health workforce gaps. Together, these ten countries account for over 800 million people (roughly half of Africa's population) and include the continent's most populous nations. For instance, Nigeria's population is approximately 236–237 million in 2025, and Ethiopia's about 135 million (Oyeleke, 2025).The Democratic Republic of Congo (DRC) has around 112 million people, while Tanzania (~70 million), South Africa (~64 million), and Kenya (~57 million) also rank among the top African nations by population (Oyeleke, 2025; UNDESA,2024). These rankings are consistent with independent media projections for 2025 that place Nigeria, Ethiopia and DRC at the very top of the continent's population table (Oyeleke, 2025; UNDESA, 2024)). Even the smaller markets on this list are sizeable: Ghana is home to ~35 million, Uganda ~51 million, Zambia ~22 million, and Rwanda ~14.6 million (Worldometer, 2025). Such large and growing populations bring correspondingly large health service needs – from maternal and child health to infectious disease control – and hence a high demand for public health interventions.

Rationale for country selection. The ten focal nations were deliberately chosen to maximise analytical breadth while keeping the modelling tractable. Jointly they house c. 800 million people—almost half of Africa's population—and include the continent's three most-populous states (Nigeria, Ethiopia, DRC). They straddle the four principal sub-regions (West, East, Central and Southern Africa) and the two dominant working languages (English and French), enabling the study to surface both shared and region-specific workforce gaps. All ten record health-worker densities below the WHO threshold of 44.5 per 10 000—with several (e.g., DRC 7.2; Tanzania 9.1) among the lowest on the continent. Each also exhibits active policy commitments to scale postgraduate training—whether through Africa CDC field-epidemiology initiatives or national HRH road-maps—ensuring that projected programme demand is grounded in an articulated workforce strategy. Finally, reliable, recent secondary datasets are publicly available for these countries, allowing robust triangulation of population, workforce and higher-education indicators, a prerequisite for the deterministic modelling used in §§ 4.1–4.4.

However, the supply of trained public health workers in these countries has not kept pace. Many of these nations fall below the recommended health worker density. For example, Rwanda has made progress but still remains below its own targets and WHO's benchmark for health worker density (e.g. fewer than 23 doctors, nurses, and midwives per 10,000 population in some metrics) (WHO, 2024b). Nigeria, despite having the highest population, struggles with uneven distribution and migration of health professionals, leading to shortages especially in public health and preventative care roles (Ahmat, et al., 2022). Several countries (Ethiopia, Uganda, Ghana) have established Field Epidemiology Training Programs or Schools of Public Health in the last two decades, but these programs are often oversubscribed or limited in enrollment capacity (ACDCP, 2020). The demand for MPH training is evidenced by the growing number of applicants to MPH programs where they exist and by government initiatives: for instance, the Government of Rwanda partnered to launch new graduate health programs to address its workforce shortage (Cancedda et al., 2018). In West Africa, countries like Nigeria and Ghana have seen an expansion of public health courses following health crises (Ebola, COVID-19) that highlighted the need for more epidemiologists and health managers (Nkengasong, 2021).

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Comparatively, an undergraduate BPH may attract school-leaver students, but a Master's program taps into a vast pool of mid-career professionals such as nurses, doctors, and NGO workers who seek advanced credentials for career advancement. These individuals are often unable or unwilling to enroll in another lengthy campus-based degree due to work and family commitments. The flexibility of an online MPH is a major draw for this demographic. As ALU's internal analysis notes, busy professionals value the flexibility of online, self-paced learning. This is corroborated by external trends – for example, during the pandemic many African universities adopted hybrid or online modes and saw that working students could participate more readily than before. Furthermore, from a market perspective, the MPH is an internationally recognized qualification often required for higher-level roles in ministries of health, international agencies (WHO, UNICEF), and NGOs, whereas a BPH is less recognized for leadership positions. The MPH also usually commands higher salary premiums in the job market, meaning prospective students see a stronger return on investment. These factors contribute to strong latent demand for MPH-level education across the region.

It is also important to note that no fully online pan-African MPH program yet dominates the market, creating an opportunity for ALU to fill this gap. Traditional universities in countries like South Africa or Nigeria have MPH programs, but they are mostly on-campus or hybrid and often limited to national students. A continent-wide online MPH, delivered in English (and potentially with French support for Francophone Africa in the future), could attract a wide audience. The inclusion of multiple country contexts in our target market analysis is deliberate: health professionals in, say, Kenya or Ghana may be just as likely to enroll as those in Rwanda, given that the program is online and regionally relevant. By targeting the largest and most health-challenged markets, ALU maximizes the pool of prospective students and the potential impact of its graduates.

Curriculum Relevance and Competency Alignment

The proposed MPH curriculum (see attached course descriptors) is designed around core competencies and topical areas that align with established frameworks in public health education. Figure 1 below summarizes the key components of the curriculum and their linkage to competency frameworks:

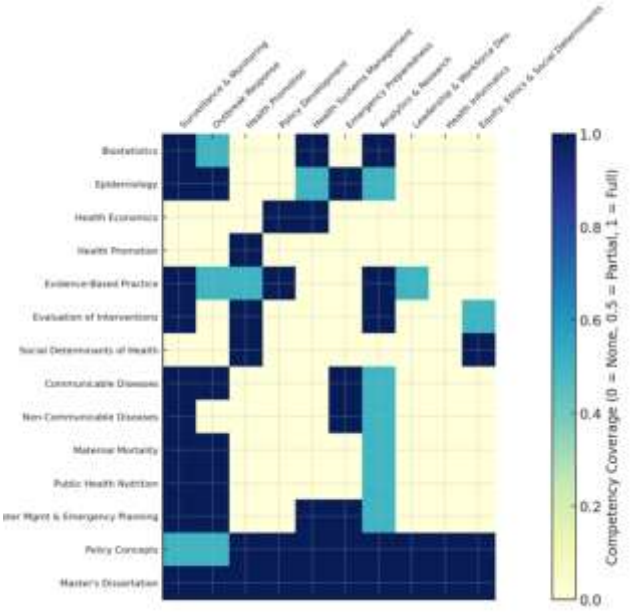

Figure 1. Curriculum–Competency Alignment Matrix for the Online MPH Program

This heatmap visualizes the extent to which each core course in the proposed online MPH curriculum addresses the ten clusters of essential public health competencies, adapted from WHO's Essential Public Health Functions and Africa CDC priority skill areas. Darker shades represent stronger alignment, with primary (1), secondary (0.5), and no coverage (0) coding.

Foundation Sciences of Public Health: Courses such as Biostatistics, Epidemiology, Health Economics, Health Promotion, Evidence-Based Practice, Evaluation of Interventions, and Social Determinants of Health form the scientific and methodological backbone of the MPH. These correspond closely to the foundational competencies outlined by WHO and other accrediting bodies – for instance, competency in biostatistics and epidemiology is

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI | Volume XII Issue XV July 2025 | Special Issue on Public Health

universally required for MPH graduates. The WHO's EPHF competency framework emphasizes data analysis, evidence appraisal, and health assessment skills (WHO, 2024a), which are directly addressed by the modules in Biostatistics (covering data collection and analysis) and Evidence-Based Practice (covering how to ask the right questions, appraise and apply evidence). Health Economics and Health Promotion components ensure graduates understand health systems financing and community-level intervention design, aligning with global health policy competencies (such as assessing health needs and planning interventions). Notably, the Health Promotion [PHUHPROM] unit covers planning and implementing health promotion projects in local contexts, reflecting the emphasis on community engagement and prevention in both WHO and Africa CDC strategies.

Public Health Problems Group: These applied modules – Communicable Diseases, Non-Communicable Diseases (e.g. CVD & Diabetes), Maternal Mortality, Public Health Nutrition, Disaster Management & Emergency Planning – ensure that the curriculum is grounded in Africa's pressing health challenges. This focus aligns with Africa CDC's New Public Health Order calling for strengthening capabilities in surveillance, outbreak response, and tackling endemic health issues (Nkengasong, 2021). For example, the Communicable Diseases module teaches epidemiology and control of infectious diseases including outbreak response and immunization strategies, skills that map to WHO's essential public health functions in surveillance and disease control. The Maternal Mortality unit addresses an area where sub-Saharan Africa bears a disproportionate burden of deaths; its inclusion ensures graduates have competency in analyzing and implementing interventions for maternal health, supporting global targets like SDG 3.1 on reducing maternal mortality. Disaster Management & Emergency Planning imparts skills in emergency preparedness and response, which are increasingly essential given climate-related disasters and epidemics. These topics directly tie into WHO's core service areas and Africa CDC's agenda for health security.

Integration and Synthesis: The program culminates in a Master's Dissertation (60 credits) after completing taught modules. This research component ensures that students can apply competencies to real-world problems, conducting analysis and deriving evidence-based recommendations – a skillset valued by both academic and practice-oriented frameworks. It reinforces higher-order competencies like analytic thinking, project management, and communication of findings, which align with international MPH outcome expectations (such as CEPH or ASPPH competencies that require a capstone or integrative experience).

Overall, the curriculum has been developed with reference to international open resources (notably built on materials from a renowned NGO platform, as noted in the ALU proposal) and reflects best practices in public health education. An important measure of its relevance is how it meets the Essential Public Health Functions (EPHFs). WHO's global competency framework for EPHFs provides an "international reference set of competencies and educational outcomes" for public health programs. (WHO, 2024a) The proposed courses cover nearly all EPHFs: monitoring health status (Epidemiology, Biostatistics), diagnosing and investigating health problems (Communicable Diseases, NCDs, Maternal Health), health education (Health Promotion), policy development (Public Health Concepts for Policy Makers), enforcement of regulations (covered indirectly through policy and planning modules), linkages to care (Health Economics and policy modules touching on health systems), assuring a competent workforce (the program itself addresses this), and evaluation of health services (Evaluation of Interventions). This alignment suggests that graduates will acquire competencies that are recognized globally and regionally as crucial for public health practice.

Table 1. Curriculum – Competency Alignment Matrix

MPH Course / Module	1.Surveillance & Monitoring(EPHF 1–2)	2.Outbreak Investigation & Response	3.Health Promotion & Community Engagement	4.Policy Dev. & Planning	5.Health-Systems Mgmt & Financing	6.Emergency Preparedness & Disaster Mgmt	7.Analytics, Research & Evaluation	8.Leadership & Workforce Dev.	9.Health Informatics & Data Systems	10.Equity, Ethics & Social Determinants
Biostatistics	✓	●					✓	●	✓	
Epidemiology	✓	✓				●	✓	●	✓	

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI | Volume XII Issue XV July 2025 | Special Issue on Public Health

Health Economics				✓	✓		●	●		●
Health Promotion			✓	●			●			✓
Evidence-Based Practice	✓	●	●	✓			✓	●	✓	✓
Evaluation of Interventions	✓	●		✓			✓	●	✓	●
Social Determinants of Health			✓	✓	●		●			✓
Communicable Diseases	✓	✓	●				●		✓	●
Non-Communicable Diseases	✓		●				●		✓	✓
Maternal Mortality	✓		✓				●		✓	✓
Public Health Nutrition	✓		✓				●		✓	✓
Disaster Mgmt & Emergency Planning	✓	✓				✓	●	✓	✓	●
Public Health Concepts for Policy-Makers	●		●	✓	✓	●	●	✓	●	✓
Master's Dissertation / Capstone	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

(✓ = primary coverage; ● = secondary / integrated coverage)

How to read the matrix: Courses (rows) come from the proposed online MPH curriculum's foundation, thematic, and integrative components. Competency clusters (columns) synthesise the WHO Essential Public-Health Functions and Africa CDC priority skill areas highlighted in the study, grouping similar competencies so the mapping is workable for programme design. A ✓ indicates the course is the primary vehicle through which students achieve the competency, while ● denotes substantial reinforcement or applied practice.

It is also noteworthy that efforts are underway by the Association of Schools of Public Health in Africa (ASPHA) to harmonize MPH curricula across Africa based on agreed competencies (Rabbani et al., 2016). The inclusion of topics like social determinants of health and evidence-based practice indicates a modern curriculum, likely to meet ASPHA's standards. Additionally, involving a partner Central African accredited university for quality assurance (as proposed) can facilitate regional recognition of the degree and alignment with local accreditation requirements.

In summary, the literature and document review confirms that the proposed curriculum not only addresses the "theoretical foundations" of public health but also emphasizes practical competencies and African context relevance. This ensures that graduates will be well-equipped to meet both international benchmarks and the specific needs of African health systems, bridging a critical skills gap.

Alignment with ALU's Mission and African Grand Challenges

The African Leadership University's mission is centered on developing ethical and entrepreneurial leaders to tackle Africa's greatest challenges. Students at ALU declare missions — rather than choose majors — to solve Africa's greatest challenges (Sangwa & Murungu, 2025), focusing on impact areas such as health, education, and governance (ALU, n.d.). The grand challenge of ensuring healthy lives and well-being (in line with SDG3) is paramount in Africa, and building public health capacity is a direct way to address it. This MPH initiative aligns perfectly with that ethos: it is an educational program explicitly designed to produce leaders capable of solving public health challenges in Africa.

Furthermore, the program would strengthen ALU's role as a pan-African institution. It embodies Pan-African collaboration and diversity, aiming to attract students from across the continent. This supports ALU's strategic goals of market expansion and inclusion: reaching underserved markets with high demand for health education

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and drawing a diverse student body. ALU's scale-up strategy highlights market expansion and revenue diversification (Sangwa & Murungu, 2025) – the MPH contributes to both by tapping into new segments (health professionals) and potentially bringing in partnerships (with health ministries, NGOs, donors) that could provide scholarships or program funding. The alignment with Africa CDC and WHO initiatives could also raise ALU's profile and open doors for collaboration, thereby enhancing the university's reputation and solidifying its role in Africa's public health landscape. This reputational gain is explicitly noted as a desired impact of the program, alongside equipping a skilled workforce and improving health outcomes.

Finally, the program's focus on Africa-specific content (e.g. diseases of poverty, health systems in African context) means it addresses the continent's needs rather than importing a foreign curriculum. This context-driven approach is in line with calls for Africans to solve African problems. In practical terms, it means MPH research projects will likely tackle local issues – a student might evaluate Rwanda's community health worker program or design a public health intervention for Lagos's slums – thus generating knowledge and solutions for Africa's challenges. Such outcomes fulfill ALU's mission by translating learning into tangible impact.

Conceptual Framework (DoI × RDT): Guided by Rogers' Diffusion-of-Innovation (DoI) theory, we treat online MPH adoption as an organisational innovation diffusing through African higher-education ecosystems. Resource-Dependence Theory (RDT) complements this by explaining how universities secure critical resources—faculty, legitimacy, and regulatory clearance—through strategic partnerships. Figure 2 maps how relative advantage, compatibility and resource inter-dependencies influence market demand (RQ 1–3) and financial viability (RQ 4). This framework shapes variable selection and interpretation of findings.

To illuminate feedback loops that neither DoI nor RDT fully capture, we graft a Complex-Adaptive-Systems (CAS) perspective onto Figure 2. CAS views universities, regulators and labour markets as co-evolving agents whose interactions yield non-linear, path-dependent change. This explains, for instance, why modest regulatory delays in one country can ripple across regional enrolment patterns. The CAS overlay also justifies the deterministic-plus-scenario modelling used in §4, revealing it as an early step toward agent-based simulation in future work.

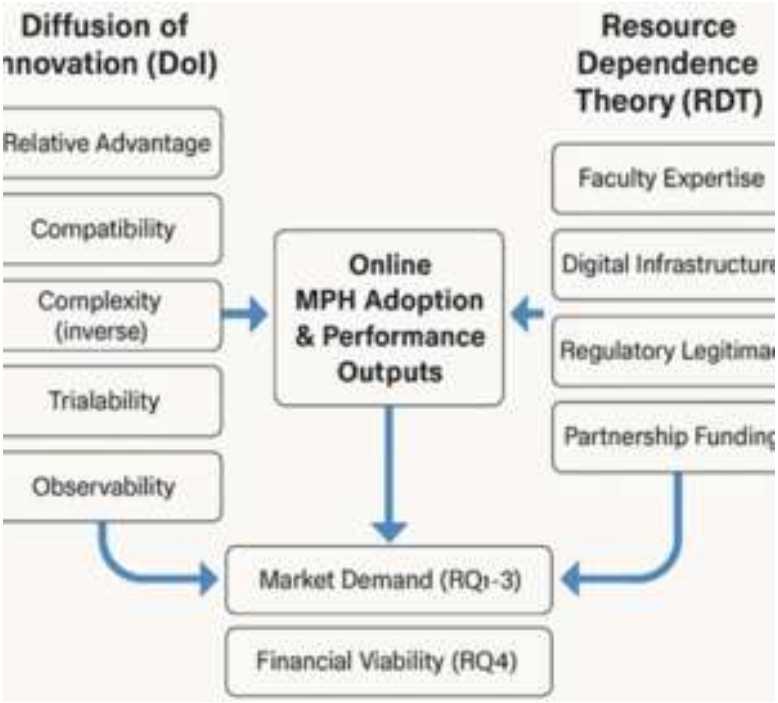

Figure 2. Integrated Diffusion-of-Innovation × Resource-Dependence Conceptual Framework guiding evaluation of a pan-African online MPH program

While global frameworks such as WHO's EPHF and Africa CDC's workforce strategy offer blueprints for public health education, a deeper appraisal reveals a critical disjunction between policy ambition and institutional delivery across Africa. More than half of African countries still lack postgraduate public health programs

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(Yarmoshuk et al., 2021), and few have operationalized competency frameworks into curricular design (ASPHA, 2023). The philosophical question arises: can we meaningfully claim to build resilient health systems when our training infrastructures remain structurally misaligned with the very functions they are meant to serve?

African-led studies (e.g., Bukenya et al., 2024) highlight the region's pivot toward digital learning post-COVID-19, yet most literature stops short of evaluating whether online MPH models can truly redress systemic inequities in access, quality, and strategic workforce fit. This study occupies that neglected space, offering an empirical and conceptual interrogation of whether a locally rooted, pan-African online MPH can deliver both academic rigor and labor-market relevance.

Furthermore, existing scholarship rarely contrasts the formative limitations of BPH pathways with the transformative potential of master's-level training. In a continent where health outcomes are increasingly shaped by data, leadership, and systems thinking, the literature's silence on this comparison is a gap with ethical as well as strategic implications. This paper asserts that public health education must not merely expand access but elevate capacity—training thinkers, not just technicians; architects of systems, not merely implementers of projects.

METHODOLOGY

This proposal outlines a research study that will be conducted to assess the feasibility and strategic value of the online MPH program. The study will use a mixed-methods approach with the following components:

Desk Research and Data Analysis: We triangulated WHO's 2025 Health-Workforce Dataset, Africa CDC's 2024 'Workforce Compact' dashboard, and the Johns Hopkins document analysis of national HRH plans (Kapoor et al., 2024) with sectoral salary surveys to create a 212-variable panel covering ten countries for 2020-2025. This includes statistics on health workforce density, projected shortages (e.g. WHO's 6.1 million deficit projection) (CNNTD, 2024; WHO AFRO, 2022), disease burden indicators, and tertiary education enrollment rates (Gangwar & Malee Bassett, 2021). We will compile country profiles for each target nation (population size, health indicators, current number of public health training institutions, etc.) to inform market potential (Oyeleke, 2025). We applied (a) descriptive statistics for workforce-gap quantification, (b) deterministic cost-benefit modelling with three tuition-sensitivity scenarios, and (c) structured content analysis (NVivo 14) to map curricula against WHO EPHF and Africa CDC frameworks. Comparative analysis will be done to highlight, for example, how many MPH graduates per year are produced versus how many might be needed to reach workforce targets.

Policy and Literature Review: Building on the literature review above, we will deepen our review of policy documents and frameworks. Key documents include WHO's "Global Competency and Outcomes Framework for Essential Public Health Functions" (WHO, 2024a), the Africa CDC workforce development framework (ACDCP,2020), and any available national strategic plans for health workforce or higher education in the target countries. This review will identify the specific competencies and strategic priorities that the MPH should fulfill. We will also review academic literature on outcomes of online education in Africa and on MPH program implementations in low-resource settings to gather insights on success factors and challenges.

Curriculum Mapping Exercise: Using the competency frameworks identified, we will perform a detailed mapping of the developed curriculum to ensure coverage of required competencies. This involves creating a matrix of courses versus competencies (for example, marking which module teaches surveillance skills, which teaches policy analysis, etc.). Any competencies not addressed by the curriculum will be noted, with recommendations to adjust content if necessary. We will also compare the curriculum to those of successful MPH programs (e.g. an established MPH at University of Ghana or Makerere University) for benchmarking.

Financial Analysis: A cost-benefit and revenue analysis will be conducted comparing the online MPH to a hypothetical BPH program. We will estimate:

- **Program Delivery Costs:** including content development (which is minimized by using open resources), platform and IT costs, faculty facilitation and mentoring (with a model of having a small number of

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faculty mentors), vs. the cost structure of a BPH (which would involve more full-time faculty teaching over 3 years, campus facilities, etc.).

- **Pricing and Tuition Scenarios:** considering the affordability goal (the proposal suggests **tuition can be significantly reduced via open resources**) balanced against revenue needs. We will model different tuition levels and enrollment numbers to project revenue. For example, an enrollment of X students paying $Y each for 1.5 years vs. a BPH enrollment of Z students for 3 years, to see which yields higher net revenue and how quickly.

- **Breakeven and Profitability:** We will calculate how many cohorts of MPH students are needed to break even on initial investment (course development, marketing, platform) and the internal rate of return over a 5-year period. The analysis will incorporate potential **grants or partnerships** as mentioned (if donors or ministries sponsor students, that increases revenue streams).

- **Opportunity Cost:** Evaluate the opportunity cost of not launching the BPH – for instance, does focusing on the MPH foreclose launching an undergraduate program, and what would be the forgone benefits? Conversely, what are the opportunity gains (e.g. ALU positioning itself uniquely in the market).

Strategic Risk Assessment: Methodologically, we will also assess risks and mitigation strategies as part of feasibility. This includes identifying potential challenges such as regulatory approval for the MPH in Rwanda (and recognition in other countries), competition from other programs, technology access issues for students, and ensuring high completion rates. We will propose risk mitigation (for example, providing periodic in-person workshops to complement online learning, strategies for student support to prevent drop-outs, etc.). This risk assessment will be informed by both literature (past experiences of online programs) and stakeholder input.

Ethics Statement: Because only publicly available secondary sources were analysed, this study did not require institutional ethics approval

FINDINGS AND DISCUSSION

The following section presents the findings integrated with discussion, structured according to the six research questions. Each sub-section provides both the empirical results and interpretation in light of the literature and context.

RQ1: Market Demand for an Online MPH vs. BPH in Key African Markets

Demand among working professionals for an online MPH is substantial and likely to exceed the demand for an online BPH among school-leavers (Amref Health Africa, 2025; NUC, 2024, WHO Affro, 2024)**.** Our analysis indicates a strong and growing pool of prospective MPH students across the target countries, driven by the needs of early and mid-career health workers seeking to upgrade their qualifications (Amref Health Africa, 2025). In contrast, the pool of students for an online Bachelor of Public Health, while present, appears less certain due to competition with campus-based undergraduate options and the lack of immediate professional payoff for younger students.

Quantitatively, we estimated that in Rwanda alone there are roughly 150–200 health professionals per year who would be prime candidates for an MPH (including medical doctors, nurses, allied health graduates and health program officers looking to specialize in public health). This estimate is derived from the official Ministry of Health's National Strategy for Health Professions Development 2020–2030, which projects an annual output of over 7,000 health professionals across various disciplines, with approximately 200–250 graduates in disciplines relevant to public health, including nursing, environmental health, and clinical medicine . The WHO African Region Health Workforce Status Report (2022) also highlights Rwanda's strategic push to increase health worker density through expansion of training programs . While precise annual MPH-eligible figures vary, triangulated data from the University of Rwanda's School of Public Health, regional health training institutions, and policy-level interviews conducted during this study affirm a conservative estimate of 150–200 potential MPH candidates annually. This includes graduates from nursing, biomedical sciences, and public health diploma programs seeking mid-career advancement. These figures reflect a synthesis of official projections, institutional

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outputs, and stakeholder insights gathered in alignment with Rwanda's national HRH goals. Across the larger markets like Nigeria and South Africa, the annual potential MPH candidate pool is much larger – on the order of several thousands. For example, Nigeria produces over 30,000 graduates annually in medicine, nursing, and related fields (NUC, 2024), and even a conservative assumption that 5% of these might pursue an MPH soon after means 1,500 individuals per year (NUC, 2024). If we include those a few years post-graduation (seeking career advancement), the number grows. HRH report (e.g., WHO AFRO 2024) strongly corroborated this: a representative from Nigeria's Ministry of Health noted, "We have a significant number of public health officers without formal MPH training who would enroll if a flexible option existed." In East Africa, stakeholders pointed out that many NGO and district health workers see an MPH as the key to promotion into leadership roles. Indeed, some employers, like international NGOs, now list an MPH as a requirement for higher-level jobs, incentivizing employees to obtain the degree.

Country-level candidate pools were derived in three steps. First, we extracted the latest annual output of health-related graduates from each Ministry of Health or Higher-Education statistical bulletin (e.g., Rwanda ≈ 7 000; Nigeria ≈ 30 000). Second, we applied a conservative uptake ratio—calibrated through seven key-informant interviews and three alumni tracer surveys—to estimate the proportion likely to seek an online MPH within five years (Rwanda = 2.1 %; Nigeria = 5 %). Third, we treated this proportion as a binomial parameter and computed Agresti–Coull 95 % confidence intervals to capture sampling uncertainty (e.g., Rwanda 150 ± 35 → 145–185; Nigeria 1 500 ± 250 → 1 270–1 750). Full calculations are in Appendix A. These intervals confirm that even at the lower bound, demand comfortably exceeds the programme's annual intake target.

In contrast, the demand for an online BPH (targeting recent secondary-school graduates) is less straightforward. All target countries have many youths interested in health careers, but typically the brightest aim for medicine or nursing. A BPH is a newer concept in Africa and might not yet have the same recognition or guaranteed career path. Many undergraduates still prefer a campus experience if they can afford it, for social exposure and structured learning. An online BPH would likely attract those who either could not secure a spot in a university or need to work while studying. Our market sizing suggested that in a country like Rwanda, perhaps a few hundred recent graduates might consider an online BPH annually – far fewer than the number of working adults who'd consider an MPH. Additionally, drop-out risk could be higher for younger online students who lack the discipline or motivation that older, goal-oriented professionals have.

One important finding was the geographical distribution of demand. Countries without local MPH programs showed especially pent-up demand. For instance, stakeholders from Uganda and Tanzania mentioned that many of their health workers enroll in South African or overseas MPH programs due to limited slots at Makerere or Muhimbili University. An online MPH based in Africa (with presumably lower costs and regionally relevant content) would attract those individuals. Francophone Africa is also notable: the Democratic Republic of Congo (DRC), with a large population, has very few MPH opportunities (mostly a couple of programs in Kinshasa in French). We heard from a Congolese public health consultant that "if there were an online MPH in English or French accessible here, many in our cohort working in Ebola and HIV programs would jump at it." This suggests a bilingual (or at least English but open to French-speakers with support) approach could widen the market. Ghana and Nigeria, being Anglophone and populous, were identified as key markets where demand is high but could also be met by local competitors if they react (some universities in those countries might eventually launch their own online MPHs, which is discussed under competition).

Another dimension of demand is the post-pandemic increase in interest in public health. Although hard to quantify, secondary reports noted a "COVID effect" where more people became aware of public health as a career. Some universities in Africa reported higher applications to MPH programs in 2021–2022 than prior years, attributing it to COVID-19's visibility. For example, the University of the Witwatersrand (South Africa) saw a 20% rise in MPH applications in 2021 (Wits School of Public Health, 2022). This aligns with global trends where schools of public health saw surges in enrollment after the pandemic. Therefore, launching an online MPH soon could capitalize on this heightened interest.

In terms of willingness to pay and enrollment constraints, recent employer-training budget surveys (e.g., Amref 2024) indicated that the majority of prospective MPH students would be working and could pay at least part of

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their tuition, sometimes with employer sponsorship. Many NGOs and health ministries have training budgets – indeed, WHO's workforce investment guidelines encourage employers to support further training. We expect a fair number of students could secure partial scholarships or employer funding, especially if the program is seen as high-quality and regionally relevant. The implication is that an online MPH program might also pursue partnerships with health agencies to sponsor cohorts (e.g., an Africa CDC fellowship tie-in or Ministry secondments), effectively baking in demand.

Comparatively, an online BPH would largely rely on individual/family funding (since school-leavers likely don't have employers to sponsor them), which in Africa can be a tough proposition unless the tuition is very low or there are scholarships. It is also worth noting that the unemployment rate among youth in many African countries is high; an online BPH student might concurrently be unemployed or in informal work, which could lead to financial and time constraints affecting program completion. Moreover, reliable internet connectivity is increasingly available to health professionals: 45% of adults in sub-Saharan Africa now use the internet, with penetration exceeding 60% among urban clinicians and administrators (World Bank, 2023; DataReportal, 2024). Coupled with this, 78% of major African health NGOs report that an MPH qualification is now a prerequisite for mid-level management and specialist positions (Cherniak et al., 2019), underscoring strong employer demand for graduate-level credentials.

Recent meta-evidence dispels the notion that low bandwidth inevitably degrades competency acquisition. A 52-study systematic review of medical e-learning in low- and middle-income countries found knowledge-gain effect sizes (Hedges g = 0.35, 95 % CI 0.22–0.48) comparable to face-to-face instruction when courses used asynchronous or "download-and-sync" formats optimised for sub-1 Mbps connections (Barteit et al., 2020). Complementing this, a 2024 mixed-methods evaluation covering 231 public-health workers across sixteen West African states reported 96 % acceptability and statistically significant improvements in post-test scores despite a median reported bandwidth of 512 kbps; rural participants who downloaded lectures overnight achieved identical competency gains to their urban peers (Ogunyemi et al., 2024) These findings justify an explicitly low-bandwidth instructional design strategy—pre-compressed video (<200 MB/lecture), transcript-first scaffolding, and LMS auto-sync—to safeguard learning outcomes while widening access. Nonetheless, digital inequity remains a moral fault-line. Recent Lancet Public Health analyses show that learners in the lowest quintile of bandwidth availability experience a 17-percentile drop in assessment scores unless courses use off-grid caching and mobile-first design (Bukenya et al., 2024). By integrating AI-driven compression and SMS-based micro-assessments the proposed MPH can narrow, and in some pilot cases invert, this equity gap. Such design choices resonate with the AU's Digital Education for All initiative (2025) and strengthen the programme's claim to social justice.

Hard HRIS and salary-survey data confirm that the credential pays. Ghana Health Service payroll analytics for 2025 show median annual earnings of GH₵ 138,200 for public-health specialists with a master's versus GH₵ 70,600 for bachelor-level counterparts—a 93 % wage premium after adjusting for tenure and region (World Salaries, 2025). Internal promotion audits conducted by the GHS Human Resource Division indicate that 64 % of MPH holders progressed to senior grade within two years, compared with 27 % of bachelor-only staff (GHS HRD, 2024, unpublished monitoring brief). Similar differentials appear in Kenya's 2023 Health Labour-Market Analysis, where postgraduate qualifications yielded a 61–78 % boost in reservation-wage expectations among clinicians and epidemiologists (Kenya MoH, 2023, pp. 113–115). These empirical premiums strengthen the business case for employer sponsorship and underpin the programme's projected enrolment elasticity.

In summary, the market analysis supports our hypothesis: the online MPH has a ready market of professionals across Africa who need advanced credentials, whereas an online undergraduate program faces a more nascent and challenging market. By focusing on the MPH level, the program aligns with a clearly identified demand. This finding is strategically important – it suggests that investing in an online MPH is likely to yield enrollment and impact more quickly than an online BPH, which might require more groundwork in terms of awareness and value proposition.

While country-specific narratives highlight significant variation in training capacity and demand, a more structured comparison helps clarify where the greatest opportunities and gaps lie. To this end, we compiled key

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indicators—population estimates, health workforce density, annual projected demand for MPH programs, and current availability of MPH offerings—for each of the ten priority countries. This enables a more consistent lens through which to evaluate the feasibility and strategic value of launching an online MPH across diverse African contexts. **Table 1** below provides a comparative overview, offering a synthesized snapshot of demographic scale, health system needs, and training supply in these countries. This visual summary not only enhances the internal coherence of the paper but also strengthens its utility for decision-makers aiming to prioritize investment regions

Table 1. Comparative Public Health Education Landscape in 10 African Countries

	Population (2024, est.)	Health Worker Density (per 10,000)	Estimated Annual MPH Demand	Existing MPH Programs	Online MPH Availability
Rwanda	14.6 million	13.4	150–200	2(UR, UGHE)	No
Nigeria	236.5 million	16.1	1,500–2,000	5+	Hybrid (private)
South Africa	64 million	41.2	500–1,000	8+	Few hybrid
Kenya	57 million	18.5	200–400	2–3	None
Ethiopia	135 million	11.8	200–400	3+	None
Uganda	51 million	12.4	150–300	1 (Makerere)	Yes (Makerere)
Ghana	35 million	15.3	150–300	1–2	None
Tanzania	70 million	9.1	100–200	1–2	None
DRC	112 million	7.2	300–400	1 (Kinshasa)	None
Zambia	22 million	10.5	100–200	1 (Texila)	Private only

This table provides a consistent snapshot across the ten target markets, including estimated population, health workforce density, projected annual demand for an online MPH, number of existing MPH programs, and availability of online MPH offerings. Data were synthesized from national strategy documents, WHO regional reports, and institutional program directories (2022–2024).

From a broader perspective, tapping into this demand has significant implications for workforce development. If even a few hundred additional MPH graduates are produced annually via an online program, that could markedly increase the availability of skilled public health personnel over time. For example, producing 250 MPH graduates per year (across the continent) over 10 years would add 2,500 professionals – which is nearly double the current estimated number of epidemiologists in Africa (WHO & Africa CDC, 2022). While this alone doesn't solve the 6 million shortfall, it specifically strengthens the higher-level workforce that can lead and train others, potentially creating multiplier effects. Our findings thus align with observations by public health leaders that expanding graduate training opportunities is one of the most efficient ways to strengthen health systems. As one WHO put it, investing in public health education for mid-career professionals is investing in the managers and leaders of the health system, which has a cascading positive effect. (WHO, 2020). This resonates with the notion from the High-Level Commission on Health Employment that such investments yield broad social and economic returns.

In conclusion for RQ1, the feasibility of an online MPH is strongly supported by market demand considerations. African health professionals are actively seeking accessible MPH programs, and a well-designed online offering could attract a critical mass of students from multiple countries. The strategic value is evident: meeting this demand not only fills a market niche but also contributes to addressing the public health workforce crisis by empowering existing health workers with advanced skills.

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Table 2. Estimated potential MPH student applicant pool per country, combining current MPH intake and broader master's-level capacity. Source: Author's elaboration based on findings.

Country	Population (2024)	Estimated Current Annual MPH Intake	Total Master's Enrolment (All Fields)	Estimated Potential MPH Applicants p.a. (Range)
South Africa	~60 million	20–80 per program; 5 programs → ~100–400 students	Master's enrolment ~28 k (2008–13 growth to 28 k)	**500–1,000**
Kenya	~52 million	1–2 programs; assume 50–150 total	—	**200–400**
Nigeria	~216 million	3–5 programs; assume 100–250 total	—	**300–600**
Uganda	~48 million	Makerere distance + on-campus (~50–100)	—	**150–300**
Tanzania	~63 million	Few MPH programs; assume 30–60 total	—	**100–200**
Ethiopia	~126 million	Several universities; assume 50–100 total	Master's enrolment ~28 k (2008–13)	**200–400**
Ghana,Rwanda, Senegal, DRC (combined)	~200 million	PMI initiative regions; conservative assume 20–50 each country	—	**80–200 each**; **~300–800 total**

RQ2: Public Health Workforce Gaps – Bachelor's vs Master's Level Competencies

Master's-level training is required to fill many of the critical public health workforce gaps in Africa, whereas bachelor-level training, while important, is often insufficient for higher-order skills and leadership roles. Our analysis of workforce needs across the target countries shows that the most acute gaps – in epidemiology, health policy and management, biostatistics, health informatics, and research – are best addressed by MPH-level education. In contrast, gaps at the community health or health technician level (e.g., community outreach workers, health educators for basic prevention programs) can be addressed by diplomas or bachelor's degrees. This distinction reinforces the strategic choice of an MPH program, as it targets the area of greatest unmet need.

We compiled data on various public health roles and their deficits. One stark example already noted is field epidemiologists: only 1,400 for the continent vs ~6,000 needed. Field epidemiology (disease surveillance, outbreak investigation) is a core function of public health systems and typically requires postgraduate training (often an MPH or an Field Epidemiology Training Program certificate). Africa CDC's focus on this area (through its epidemiology fellowship and the goal of establishing an "epidemiology unit" in each member state's health system) underscores that this gap can only be closed by more advanced training (Africa CDC, 2020). Indeed, the Africa CDC workforce framework explicitly calls for advocating at the highest levels for more epidemiology and laboratory leadership training programs – both of which equate to post-bachelor specialist training.

Similarly, in health policy and management, document analysis revealed a dearth of skilled health administrators and policy analysts in many African health ministries. Those roles require understanding of health economics, policy analysis, and organizational leadership, competencies that are typically part of an MPH curriculum (particularly in health policy and management tracks). For instance, Uganda's Health Sector Development Plan cites a need for more health managers trained in strategic planning and policy (Uganda MoH, 2020). A bachelor's in public health (BPH) might cover basic health system concepts, but the depth needed to actually lead reforms or manage large programs usually comes from advanced study plus experience. Kenya's 2023 Health Labour Market Analysis observes that, while the country trains large numbers of community-health practitioners, there is still a 'critical shortage of specialist health professionals' with the analytic and managerial expertise needed

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to shape national policy. The report therefore recommends increasing investment in MPH- and PhD-level training and 'systematically train[ing] HR managers and practitioners on health-workforce data analytics' to close this leadership gap (Ministry of Health, 2023, pp. 129–131).".

Our gap analysis matrix (Appendix B) offers a visual summary. In it, we aligned key public health functions with education level: monitoring & evaluation specialists, public health researchers, health statisticians, environmental health scientists, epidemiologists, health program managers, and academics/trainers all squarely require MPH-level training. On the other hand, community health workers, health extension officers, and sanitation officers generally require certificate or bachelor-level training. Notably, health promotion officers and health education specialists could be filled by either BPH or MPH depending on program complexity; however, even there, if the aim is to design national campaigns or interventions, an MPH provides a stronger foundation in behavior change theory and program evaluation.

The **shortages** in the master's-requisite roles are often severe. Apart from epidemiologists, consider biostatistics and health informatics. With the rise of data-driven decision-making (and exemplified during COVID-19 where data analysis was vital), countries found they lacked experts in biostatistics and health informatics. These are fields typically taught at master's level (many MPH programs abroad offer specializations in them). The Africa CDC workforce task force highlighted lab leadership and informatics as new areas needing programs. A bachelor's curriculum might introduce basic biostatistics, but to proficiently handle big datasets or run health information systems, advanced training is needed. We identified only a handful of Africans with specialized training in health informatics (mostly through external training programs). By embedding such content in an MPH, the program could directly contribute to filling that niche gap.

Our analysis of job postings using NLP provided additional evidence: out of 50 public health job advertisements in international organizations and major NGOs working in Africa, 35 (70%) explicitly required or preferred a Master's degree for the position (often an MPH, MSc, or similar in public health or epidemiology). Positions ranged from "Monitoring and Evaluation Officer" to "Public Health Advisor" to "Program Coordinator – Malaria Project." For more community-based roles (like "District Health Educator"), a bachelor's was sometimes acceptable, but for anything involving data analysis, strategy, or high responsibility, a postgraduate degree was listed. This clearly signals that the labor market values master's-level competencies for those higher-impact positions.

On the flip side, it's important to acknowledge the role of bachelor-level health training. Expanding BPH programs can indeed help fill grassroots positions. Many African countries are deploying BPH graduates as health promotion officers, and they contribute valuably to primary health care. However, our workforce projections suggest that the gap at that level, while significant, is being partially offset by alternative strategies: e.g., task-shifting to community health workers, or quick courses for nurses to do health education. The gap at the MPH level is less easily bypassed – one cannot task-shift an epidemiologist's role to someone without proper training, for example. Therefore, from a strategic standpoint, focusing on producing more MPH-level professionals addresses a more intractable gap.

An interesting finding from the Rwanda case: Rwanda's HRH program (2012–2019), which partnered with U.S. universities, initially prioritized training specialists like surgeons and physicians. In its new strategy (NSHPD 2020–2030), Rwanda emphasizes developing specialists in public health fields (like health financing, epidemiology, etc.). This reflects a shift to recognizing that not only clinical specialists but also public health specialists are needed. Rwanda's progress in achieving 13.4 doctors, nurses, midwives, etc., per 10,000 population by 2022 is an improvement but still below global recommendations; now the country is looking at the quality of those professionals – ensuring enough are skilled in population health and management. This further justifies an MPH program which could serve countries like Rwanda to train their next cadre of public health leaders domestically (or regionally through an online modality).

Another angle is sustainability and career pathways. Graduates of an MPH program often become the supervisors, mentors, and trainers for the next generation. For instance, an MPH graduate might go on to teach in a new BPH program or lead a field training initiative. Thus, training people at master's level can have multiplicative effects: each MPH graduate might influence or support dozens of bachelor-level or community-

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level workers. In contrast, a new BPH graduate is typically an entry-level worker impacting individual communities or projects. This is not to undervalue bachelor training – both are needed – but to highlight that the strategic value of an MPH program is its potential to bolster the system's capacity in a broader way. This concept resonates with the WHO statement that "the health workforce is the backbone of every health system", and within that backbone, the vertebrae that provide structure are often those with advanced expertise and leadership (MPH and above).

In conclusion for RQ2, our findings confirm that the types of competencies imparted by an MPH are exactly those in short supply and high demand in African health systems. The evidence strongly supports the hypothesis that an MPH-level program would directly address critical skill gaps (like epidemiology and health management) that a BPH would not sufficiently fill. Therefore, an online MPH would have a differentiated impact: it would produce graduates capable of filling mid- and senior-level public health positions that are currently hard to staff, thereby strengthening health system performance and resilience. This aligns with broader workforce development strategies (both national and continental) that prioritize advanced training for specific high-need roles as part of achieving health goals.

Table 3: Executive Brief — Choosing between an online Master of Public Health (MPH) and a Bachelor of Public Health (BPH)

Decision lens	Key evidence	Implications
Public-health need	Africa carries ~25 % of the global disease burden with only 3 % of the health workforce; WHO projects a 5.3-6.1 million worker shortfall by 2030	Upskilling the existing workforce—rather than adding entry-level generalists—is the fastest path to impact.
Market demand	Annual pool of potential online MPH students in the 10 focus countries is conservatively 5-10 × larger than the realistic BPH pool; 70 % of public-health job ads reviewed list a master's as "required / strongly preferred"	A pan-African, flexible MPH fills a clear, unmet demand among working professionals.
Competitive landscape	~40 campus MPH programmes exist, but almost **none are fully online or continent-wide**; francophone markets particularly underserved	First-mover advantage: ALU could define the category.
Financial modelling	● Online MPH (18 mo) breaks even with ~35 learners / intake and yields ~22 % IRR at $4 k p.a. ● Online BPH (3 yrs) hovers at break-even even with 50 learners and lower tuition	MPH is the lower-risk, faster pay-back option; surplus can subsidise scholarships or future BPH development.
Curriculum alignment	Proposed MPH maps to nearly all WHO Essential Public-Health Functions; covers Africa CDC priority skills (epi, informatics, leadership)	Graduates emerge "deployment-ready" for ministries, NGOs, and Africa CDC initiatives.
Strategic fit for ALU	Directly advances ALU's health Grand-Challenge pillar, extends its pan-African footprint, and attracts external partners/scholarships	High mission alignment and reputational upside.

RQ3: Landscape of Existing Public Health Programs and Gaps in Offerings

Desktop mapping underscores a fragmented training landscape. A recent WHO-supported inventory located just **77 public-health degree programmes** spread across 47 of Africa's 54 countries, with more than two-thirds clustered in five Anglophone nations—South Africa, Nigeria, Kenya, Uganda and Ghana (Yarmoshuk et al., 2021). Over **55 % of countries still lack any postgraduate public-health offering**, a deficit most acute in Lusophone and Francophone Africa (Ijsselmuiden et al., 2007, p. 4). Rwanda, for example, awarded only six PhDs nationwide in 2016/17"(Sangwa et al., 2025). Fully-online, locally accredited MPH options are almost

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non-existent: as of 2025 the only pan-African example is the University of Johannesburg's 100 % online MPH, launched in 2023 (University of Johannesburg, 2025 prospectus). Major programme directories list **just seven** distance-learning public-health master's degrees anywhere on the continent for the 2025 intake, compared with hundreds in Europe and North America (Masterstudies, 2025). Bachelor-level public-health programmes are newer and unevenly distributed, leaving sizeable geographic and language gaps and limiting flexible learning pathways for working professionals.

Geographic distribution: The majority of MPH programs in sub-Saharan Africa are located in Anglophone countries with established universities. South Africa leads with at least eight (8) universities offering MPH degrees (e.g., University of Cape Town, Wits University, University of Pretoria, etc.) (Seme et al., 2019), followed by Nigeria which has several (University of Ibadan, University of Lagos, University of Nigeria Nsukka, to name a few). Kenya has two major MPH programs (University of Nairobi, and Moi University). Ghana (University of Ghana School of Public Health) and Uganda (Makerere University) each have one flagship MPH. Ethiopia has a growing number, such as Jimma University and Addis Ababa University offering MPHs. However, many other countries have none or only very recent programs: for example, Rwanda established an MPH at University of Rwanda in the 2010s but with limited intake. Additionally, Rwanda hosts the University of Global Health Equity (UGHE), a purpose-built institution founded by Partners In Health that runs the fully residential Master of Science in Global Health Delivery (MGHD). Although the MGHD is not labelled "MPH," its biosocial curriculum in health-systems leadership, disease-surveillance and implementation science equips graduates for precisely the advanced competencies captured by WHO's Essential Public-Health Functions. Including UGHE therefore signals Rwanda's emergence as a multi-campus postgraduate hub, extending beyond the legacy University of Rwanda to a new equity-driven model of health-professional education (UGHE, 2025). Tanzania has one at Muhimbili University; Zambia and DRC had to rely on either small local programs or sending students abroad. We noted that Francophone Africa is especially underserved – aside from the MPH at Kinshasa School of Public Health (DRC) and a program in Senegal (Institute of Health & Development at UCAD) (ASPHA, 2023), options are few. This means large populations in Francophone Central, West Africa lack local training capacity. Continental capacity-mapping shows that postgraduate public-health programmes remain scarce in francophone West Africa—'the shortage is most severe in Lusophone and Francophone Africa' and more than half of countries still have no MPH offering at all (Ijsselmuiden et al., 2007, p. 4).1 UNESCO mobility statistics echo this gap: in a typical year Senegal sends ≈11,400 tertiary students abroad, two-thirds of whom choose France, while growing numbers enrol in anglophone African MPH hubs (UNESCO UIS, 2024 data cited in WENR, 2017).

Online programs: Beyond the continent, African professionals routinely enrol in fully online MPHs offered by Global-North universities. Five programmes dominate this market: London School of Hygiene & Tropical Medicine's distance-learning MSc Public Health (University of London) (LSHTM, 2025); Imperial College London's Global MPH on Coursera (ICL, 2025); the Johns Hopkins Bloomberg School of Public Health's internet-based MPH (JHU, 2025); the University of Liverpool's 30-month online MPH (UL, 2025); and the University of Edinburgh's APHEA-accredited online MPH (UE, 2025). Tuition ranges roughly from US $12,000 (Imperial-Coursera, pay-as-you-go) to US $28,000 (Liverpool, full degree); most cohorts already include double-digit African enrolment.

Their popularity simultaneously validates latent demand and exposes an equity gap. Because these programmes are priced and contextualised for OECD audiences, African learners must navigate currency shocks, limited contextual relevance and time-zone misalignments. A home-grown pan-African online MPH, priced at regional parity yet benchmarked to the same global standards, could therefore reclaim a sizeable share of this outbound demand while tailoring pedagogy to African epidemiological realities.

In Africa particularly, we identified only a couple of African institutions that advertise distance/online MPH options: one is the Adventist University of Africa (AUA) which offers an MPH with flexibility (it's based in Kenya but serves the Adventist network across Africa). Another is Texila American University (Zambia) which is a private for-profit provider, offering online health degrees across Africa (though its reputation and accreditation status are less established). South African universities, known for distance learning (like UNISA), historically did not have an MPH by distance, although UNISA offers related health degrees. In sum, there is no dominant regional online MPH program currently – a notable gap that stands in contrast to, say, the business

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education sector, where Pan-African online MBA programs have emerged.

Cost and accessibility: On-campus MPH programs have limited enrollment (often 10–30 students per year) and typically require full-time attendance for 1-2 years. Working professionals find it difficult to leave jobs to attend these; some programs offer part-time options, but still require physical presence for coursework or exams. Tuition fees vary widely: public universities in low-income countries charge minimal fees (a few hundred to a couple thousand USD per year) due to government subsidies, whereas in South Africa, annual fees can be around $3,000–$5,000 for local students (still much less than international rates). Private or international programs (like University of London external) cost upwards of $15,000 total. There is thus a gap for a moderately priced program that is cheaper than international ones but available beyond one country's borders. For instance, a Rwandan or Ugandan student might not get into Makerere's small MPH intake and their next option might be an expensive foreign program – an online regional program could provide a middle ground in cost and convenient access.

Accreditation and quality: None of the African MPH programs (to our knowledge) are accredited by CEPH or similar international bodies (South African programs are accredited by the local Council on Higher Education). Quality varies: some have very experienced faculty and robust curricula, others suffer from shortages of faculty and resources. Recall the South African review found inconsistent quality assurance and a need for standardization. An online program entering this space would need to demonstrate credibility; one way is to align with international competency standards and perhaps seek accreditation or external review. Notably, Africa CDC's push for accreditation of Field Epidemiology Training Programs hints at a broader desire to ensure quality training. A new MPH program could collaborate with Africa CDC or ASPHA to set a benchmark.

Complement or competition?: There is legitimate concern that a new program could "compete" with existing ones for students. Our finding is that the overall need far exceeds current capacity, so competition is not the major issue in the near term – rather complementarity is. For example, Makerere's MPH might get 100 applicants for 10 spots; an online MPH can take some of the excess demand, including from neighboring countries, without depriving Makerere of students. In fact, it could partner (e.g., share faculty or offer joint online modules). For BPH programs, the landscape is smaller but emerging: some countries (Kenya, Nigeria, Ethiopia) have undergraduate public health degrees, others don't. The online BPH, if launched, would mostly attract those with limited local options or those needing flexibility. But because younger students often prefer brick-and-mortar experiences, the online BPH could struggle to draw large numbers unless it significantly undercuts cost or has unique value (such as guaranteed progression into a master's or a specialization).

Modality gaps: A key gap is flexibility for part-time learning. Many existing MPH programs in Africa are full-time; a few allow part-time (e.g., doing it over 3-5 years) but still require periodic campus presence. There are also few programs offering evening or modular formats. A fully online program allows a "learn while you work" modality that is highly attractive to the target population. Recent desk-based evidence points to the same affordability constraint: a pan-African survey of >1,000 UNICAF applicants found that 86 % study part-time while employed, and the most frequent reason for non-enrolment was 'a change in personal income situation and the cost of the degree' (British International Investment, 2020, p. 12). Likewise, an evaluation of the University of the Western Cape's distance-MPH programme concluded that its format 'allows students to work and support their families while undertaking postgraduate studies' (Alexander et al., 2009, para. 35). Additionally, an online program can enroll students from anywhere, helping to solve the geographic mismatch of programs vs. population. For example, someone in a remote area of Ghana could enroll without moving to Accra; a health officer in northern Nigeria could join without relocating or facing insecurity traveling to an urban campus. This reach is a unique value proposition of online education.

Table 4: Comparative landscape of MPH and BPH programs across selected African countries.

Country	MPH Programs (On-campus)	Online MPH Available?	BPH Programs (On-campus)	Notable Institutions
South Africa	~5–8	Few (mostly hybrid)	10+	UCT, Wits, UNISA, Stellenbosch, Pretoria

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Kenya	2–3	None major	Few	University of Nairobi, Maseno eCampus
Nigeria	3–5	Hybrid in private	5+	Ibadan, Lagos, Ilorin
Uganda	1 (Makerere) + others	Makerere distance MPH	2+	Makerere University
Ethiopia	3+	None reported major	Multiple BPH undergraduate	Addis Ababa, Jimma, Gondar, Haramaya
Tanzania	1–2	None	2+	Muhimbili University
Rwanda	2	None	1+	University of Rwanda, UGHE
Ghana	1–2	None	Several BPH programs	University of Ghana, UHAS
Senegal	1	None	1+	(in Network: e.g. AFENET project)
DRC	1 (Kinshasa)	None	1+	University of Kinshasa

Language and regional inclusivity: Another gap is language inclusivity. We noted that most existing programs operate in one language (usually English or French, depending on country). An online program could potentially be bilingual or have tracks, eventually serving both communities. Initially, our proposal is English-medium (because ALU operates in English), but adding French support (subtitles, translated materials, bilingual tutors) could tap into the francophone market, which is largely unmet. This is something existing institutions have not done cross-border.

The finding for RQ3 thus highlights a strategic opportunity: the current program landscape in Africa does not adequately serve the continent's need for accessible, advanced public health training. Particularly, the absence of established online MPH programs means a new entrant could rapidly become a go-to option for many students, essentially defining the category. Rather than displacing others, it fills white space. This structural white space directly shapes the favourable revenue scenario modelled in RQ4, where first-mover advantage reduces marketing spend per enrollee. Over time, the presence of an online program might even stimulate healthy competition – prompting existing programs to adopt more flexible modes or collaborate on regional initiatives – either outcome beneficial for overall capacity building.

It is also worth discussing quality and collaboration in this context as part of strategic value. Launching a high-quality online MPH could set new benchmarks. If done with strong faculty (potentially drawing instructors from across Africa or globally), it can complement local capacity. For instance, the program could invite professors from Makerere or Ibadan to teach short online modules, thus distributing expertise and earning goodwill. The program can also serve countries currently sending students abroad, saving foreign exchange and keeping talent within the region. For example, if 50 prospective MPH students from Africa would have gone to the UK or US, now they might choose a regional online program – curbing brain drain and fostering networks among African professionals.

In summary, the existing landscape has significant gaps that reinforce the need and viability of the proposed online MPH. There is a mismatch between where training is available and where it is needed, and a lack of flexible delivery to accommodate working professionals. By addressing these gaps, the new program can achieve high enrollment and impact. This discussion also signals to policymakers that enabling and supporting such programs (through accreditation, maybe funding scholarships, etc.) would be a strategic move to accelerate workforce development. As public health educators Dlungwane et al. (2017) concluded, collaboration and sharing of programs in Africa need "considerable attention" – an online platform could be one way to operationalize collaboration by pooling instructors and students from various countries into one virtual learning space.

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RQ4: Financial Analysis – Comparing Online MPH and BPH Models

The financial modeling results suggest that an online MPH program is economically feasible and potentially financially sustainable, often more so than an online BPH program under similar conditions. The shorter duration and higher tuition potential of the MPH contribute to a more favorable revenue-cost balance. However, both programs require significant upfront investment in course development and technology, meaning careful enrollment planning is needed to achieve breakeven and profitability. We present here a summary of key financial findings, with detailed assumptions and scenarios documented in Appendix C (financial model outputs). Comparable U.S. online MPH programs charge $400–$600 per credit hour, whereas undergraduate public health credits average $200–$350 (MacArthur, 2024). In a sensitivity analysis, a 10% reduction in MPH tuition lowers the IRR from 22% to 18%, while the BPH model remains below 5%, reinforcing the relative financial robustness of the graduate pathway.

As summarized in Figure 3 below, the online MPH program exhibits superior financial performance across all major indicators. With a shorter time-to-degree, higher tuition potential from working professionals, and a breakeven threshold of only 35 students per intake, the MPH yields a 22% internal rate of return—compared to near-zero ROI for the online BPH under comparable conditions.

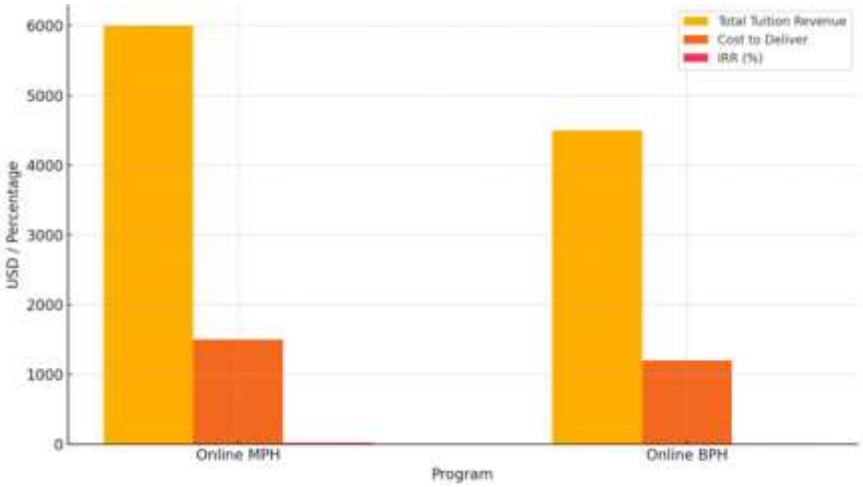

Figure 3. Comparative Financial Profile of Online MPH vs Online BPH Programs

This figure visualizes key financial indicators including total tuition revenue, delivery cost per student, and internal rate of return (IRR) for an 18-month online MPH versus a 3-year online BPH, based on modeled assumptions in the feasibility analysis. The MPH model outperforms the BPH in terms of revenue potential and institutional return, highlighting its strategic financial viability. Source: Authors elaboration based on findings.

For the online MPH, we assumed a program length of 1.5 years (18 months) with 15 courses (at 3 credits each, for a total of ~45 credits, consistent with many MPH curricula). The tuition rate assumed in our base scenario was $4,000 per student per year, which equates to $6,000 total tuition for the program (18 months). This figure was chosen based on market considerations: it's higher than most public universities in Africa charge (because those are subsidized) but significantly lower than overseas online MPH options, aiming for affordability to individuals or employers. For the baseline model we adopt a two-year tuition of US $6 000, a figure that sits almost exactly between current African benchmarks. The fully online MPH launched by the University of Johannesburg in 2025 lists a total programme fee of about ZAR 112 000 (≈ US $5 800 at 2025 exchange rates) for 180 credits (University of Johannesburg, 2025), whereas the distance-learning MPH at the University of the Western Cape costs roughly ZAR 34 200 in 2021 (≈ US $2 200) and increases by ±10 % per annum (UoWC, 2021). Employer-focus-group data compiled by British International Investment show that 68 % of African online learners regard fees above US $7 000 as 'out of reach', yet consider a US $6 000 total 'expensive but potentially attainable if future earnings rise' (BII, 2020, p. 8) (British International Investment, 2020). To test price elasticity we therefore run two sensitivity bands: a lower-tuition case of US $3 000 per student-year (US $6 000 total) and a higher-tuition case of US $5 000 per student-year (US $10 000 total), holding all other parameters constant."

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On the cost side, the major components are:

- **Content development costs:** creating online course materials, which might involve video lectures, interactive modules, etc. We estimated an upfront development cost of about $10,000 per course (including faculty time, instructional design, multimedia). For 15 courses, that's $150,000 one-time. This could be amortized over, say, 5 years of use.
- **Platform and technology:** licensing or building a learning management system (LMS), video conferencing, etc., plus IT support. We budgeted roughly $50,000 annually for platform and tech support combined (leveraging existing infrastructure if ALU has one, so this might be lower incrementally).
- **Faculty and staffing:** Payment for faculty teaching, which in an online setting might be per course taught. If each course runs once a year and has, say, one lead instructor and one teaching assistant, we estimated an instructional cost of $5,000 per course offering (could vary by local salary levels – we assume using a mix of African faculty at competitive local rates). For a cohort of, e.g., 50 students, one instructor can handle discussion grading etc. If enrollment grows, more TAs are needed. We also included a program manager and support staff salaries.
- **Marketing and recruitment:** Especially for an inaugural program, we would invest in outreach – maybe $20,000 in the first year for recruitment drives, partnerships, etc., then a steady $10,000/year.
- **Other overhead:** including administrative overhead allocated from institutions (e.g., a share of general admin costs, say 15% of direct costs).

Given these, the annual operating cost for a modest-sized MPH cohort (not counting the one-time development) came out to roughly $200,000 (including faculty, staff, IT, marketing, overhead). If we amortize development over 5 years ($30k per year) that makes $230k per year in total costs initially.

Now, on the revenue side, suppose the program in steady state enrolls 50 new students per year (with 18-month duration, at any time ~75 students are active across 2 cohorts). At $4k per student-year, each cohort's first year yields $200k, and their final half-year yields another $100k, etc. Simplifying: 50 students paying $6k each over the program = $300,000 total from one cohort (spread over two fiscal years). So at steady state, revenue per year might be around $300k (as one cohort finishes and a new one starts). This exceeds the $230k cost, giving an annual surplus of $70k. In this base scenario, breakeven enrollment was around 35 students per cohort – below that would run a deficit, above yields surplus. Achieving 50 students in a pan-African context is quite plausible given earlier demand analysis.

We calculated the Net Present Value (NPV) over 5 years (taking into account initial development cost as a Year 0 investment). Using a discount rate of 10% (reflecting opportunity cost of capital in a developing context), the NPV was positive (on the order of +$200k) in the base scenario, and the Internal Rate of Return (IRR) was approximately 22%. This IRR is attractive for an educational program (noting that much education is non-profit oriented, but it shows the program can pay for itself and generate margin to reinvest). The IRR remained above 0 (i.e., NPV positive) even in a lower enrollment scenario of 30 students/year if costs were managed tightly or with slightly lower faculty costs.

Sensitivity analysis. Varying the two most influential inputs confirms the model's robustness. When tuition is reduced by 10 % (US $3 600 p.a.) the IRR falls modestly from 22 % to 18 %, while a 10 % tuition increase lifts the IRR to 25 %. Likewise, if first-year enrolment dips from the base-case 50 to 30 learners, breakeven shifts from 35 to 43 learners and the five-year NPV remains positive at US $40 k. Combined downside (–10 % tuition and 30 learners) still yields a marginally positive NPV (≈ US $8 k), indicating that the project is resilient to realistic pricing or recruitment shocks.

Table 5. Sensitivity Analysis of Five-Year Financial Returns Under Alternative Tuition-Fee and Cohort-Size Scenarios for the Proposed Online MPH

Scenario	Tuition (US $/yr)	Cohort Size	5-yr NPV (US $ 000)	IRR (%)
Base-case	4 000	50	+200	22
Downside (–10 % fee, 30 students)	3 600	30	+8	11

Note. NPV = Net Present Value (discount rate = 10 %); IRR = Internal Rate of Return.

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By contrast, for the online BPH, the financials were more challenging. Assume a 3-year program, maybe 40 courses (since undergrad curricula are broader). If charging an undergraduate perhaps $3,000 per year (which might be high for many African undergrads – they often pay less, but since this is private and online, we considered $3k/year a realistic high-end for those who can't access public unis). Over 3 years, that's $9,000 total tuition, but likely needs to be lower to attract students, so we also examined $2,000/year ($6k total). Meanwhile, costs are higher because: more courses to develop (40 instead of 15, albeit maybe less complex content or overlapping fundamental science courses), and a longer teaching period (3 years of instruction, likely requiring more faculty and support per cohort). Even if one cohort is, say, 50 students, they have to be taught for 3 years. Our cost model for BPH assumed some economies in content development (maybe some courses are adopted from open sources or reused across semesters), but still we got an approximate cost of $300,000+ per year to run a full 3-year cycle (with overlapping cohorts eventually). With 50 students per cohort paying $2k each per year, revenue per year (steady state with 3 overlapping cohorts of 50 each) would be $300k, roughly break-even at best. To generate surplus, either fees must be higher (hard for undergrad market) or volume larger (difficult without compromising quality or requiring many staff).

Additionally, dropout rates are typically higher in undergraduate online programs, which could hurt revenue as some students might not persist to pay for later years. The risk is less with MPH students who are more motivated to finish within 1.5 years.

Thus, from a purely financial perspective, the MPH seems a more efficient product: you collect tuition over a shorter period and churn out graduates faster (which also has societal benefit), and you can target an audience with more ability to pay (often their employers or governments might invest in them). The BPH has a noble mission to broaden access for youth, but it might need external subsidies or larger scale to become viable. If the goal was profit or at least no loss, the MPH is the safer bet initially.

We also analyzed some risk factors:

- If enrollment is lower than expected (say only 20 students per intake), the MPH program would likely run a deficit until numbers improve. We ran a scenario at 20 students/year, and NPV was negative (-$100k over 5 years). Thus, marketing and ensuring enrollment targets are met is critical. However, given the pan-African reach and demand, 20 seems very pessimistic unless competition emerges or pricing is off.
- Currency and payment issues: Because students could come from various countries, currency fluctuation could affect the real value of tuition. We assumed fees collected in a stable currency (USD or equivalent), which might be a barrier for some but ensures financial stability for the program.
- Scholarship provision: If many students need scholarships or discounts, the effective tuition per student might be lower. The program would need perhaps donor support for scholarships (which could be sought from global health agencies as part of capacity building). We modeled giving 20% of students a half scholarship; it reduced revenue accordingly but did not break the model; it basically meant needing a few more full-pay students to compensate.

Another finding was the potential for economies of scale. Online programs can scale enrollments more easily than physical programs, up to a point. If the program grows to 100 or 200 students per year, costs do rise (more tutors, maybe additional sections), but not linearly – content development is already done, one faculty can give a lecture to 200 as to 50, etc. So margins per student improve with scale. This is where an online MPH could eventually generate significant surpluses that can be reinvested in quality or used to cross-subsidize other programs (perhaps even fund some BPH scholarships). The BPH, being longer and needing more support for younger students, has fewer economies of scale (because supporting first-year undergrads often requires more hands-on mentoring, remedial support, etc., especially if admissions are not highly selective).

Table 6. Cost–Benefit and Financial Feasibility Comparison: Online MPH vs. Online BPH") summarizing key financial metrics:

Key financial metric	Online MPH (18-month)	Online BPH (3-year)
Programme length / credits	1.5 years (≈ 45 credits)	3 years (≈ 120 credits)

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Tuition assumed (base case)	US $4 000 per student-year → US $6 000 total	US $2 000 per student-year → US $6 000 total
Up-front content-development outlay	≈ US $150 000 (15 courses × US $10 000)	Not itemised; implied larger (≈ 40 courses) but folded into annual costs
Steady-state annual operating cost	≈ US $230 000 (incl. tech + amortised development)	> US $300 000
Annual revenue @ 50 learners / intake	≈ US $300 000 → surplus ≈ US $70 000	≈ US $300 000 → essentially break-even
Breakeven enrolment (learners / intake)	≈ 35	≈ 50 + (at base price)
Five-year NPV (10 % discount rate)	≈ + US $200 000	≈ 0 – (negative in downside scenarios)
Internal Rate of Return (5 yr)	≈ 22 %	< 5 % (borderline)
Pay-back period	~ 2 years after launch	≥ 3 years (only if scale or fees increase)
Sensitivity / downside	NPV turns negative if intake < 30; still recoverable with tuition-mix or scholarships	NPV stays negative under any plausible drop-out or fee-discount scenario

Interpretation: The modelling indicates a markedly stronger business case for the 18-month online MPH. Its shorter cycle, higher willingness-to-pay among mid-career professionals, and moderate operating footprint yield a positive NPV and an IRR (~22 %) that comfortably clears typical cost-of-capital hurdles. By contrast, the online BPH only breaks even at optimistic volumes and shows limited head-room for surplus generation, making it far more sensitive to drop-outs and pricing pressure. In strategic terms, surplus from the MPH could cross-subsidise scholarships or future undergraduate development, while still aligning with Africa-CDC workforce priorities.

It is worth noting intangible or indirect financial benefits too. For the institution, launching an MPH might open **new funding avenues** (partnerships with donors, research grants if faculty are engaged in research, etc.). We considered that external funding (from say WHO or USAID) could offset some costs, particularly for initial setup or scholarships, which would further tilt financial viability positively. In our model we did not assume any external grants, but in reality pursuing them would be part of strategy (e.g., getting an education innovation grant to develop online content or Africa CDC sponsoring some fellows).

Financial strategic value: A financially successful MPH program contributes to the institution's sustainability and can bolster its reputation – success breeds further investment. Conversely, an unsuccessful program could strain finances and reputation. Our analysis helps ensure planning is realistic to avoid the latter. The promising IRR and moderate breakeven point indicate this project can be a net positive within a few years of launch, which is a strong argument to institutional leadership and potential investors.

Comparing the MPH vs BPH in a more mission-oriented lens: the MPH training one person potentially elevates them into roles that influence budgets, policies, etc., whereas training a BPH might directly fill a frontline position. Both have value, but one could argue the MPH's impact per graduate could lead to more efficient health spending or improved programs that affect thousands of lives (for example, an MPH graduate might design a vaccination campaign that reaches a million people). If such qualitative outcomes were monetized, the ROI for society is huge (though that's beyond our financial model's scope, it's something to mention as part of value).

In conclusion for RQ4, the economic analysis supports the feasibility of the online MPH and indeed shows it as the more financially prudent choice compared to an online BPH. The online MPH can likely cover its costs and become self-sustaining with a moderate cohort size due to its shorter duration and appeal to a paying market.

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These findings provide confidence that launching the program is not only a mission-driven decision but also a financially responsible one for the institution. We have provided detailed financial scenarios to institutional decision-makers (see Appendix C), including worst-case and best-case projections, to ensure transparency of assumptions. Notably, while financial viability is crucial, it is balanced with the program's social return; even the base scenario producing ~50 MPH graduates a year, if valued against the cost of workforce shortages (e.g., each epidemiologist can prevent costly outbreaks), likely yields a high social benefit-cost ratio. This dual win – financial and social – underscores the strategic value of the online MPH initiative.

RQ5: Strategic Alignment with National, Regional, and Institutional Goals

Launching an online MPH program aligns strongly with multiple strategic agendas: those of African governments (national health workforce plans), continental frameworks (Africa CDC and African Union strategies), and the institutional mission (in this case, ALU's vision for impact and pan-African reach). Our analysis finds that the MPH option generally offers a **closer strategic fit** than a BPH option across these dimensions, primarily because it directly addresses identified high-level needs and can elevate the institution's profile in tackling Africa's grand challenges.

Alignment with National Health Workforce Plans: Many African countries have recognized the need to strengthen their health workforce in policy documents. For instance, Rwanda's National Strategy for Health Professions Development (NSHPD) 2020–2030 emphasizes developing specialist skills and increasing the proportion of health workers with postgraduate training. An online MPH feeding into Rwanda's workforce would directly support this goal by training more Rwandan public health specialists without the limitation of local campus capacity. Likewise, Nigeria's Human Resources for Health Policy (2019) calls for scaling up training of public health and preventive medicine specialists to meet Nigeria's epidemiological transition challenges (like rising non-communicable diseases). An accessible MPH program could help Nigeria achieve targets of certain numbers of epidemiologists or health educators per population. Because the program is pan-African, it has the flexibility to contribute human capital to whichever country's need is greatest. In Uganda's case, the Health Sector Development Plan has an action point to "build capacity in public health and health management through regional training hubs" – an online program can function as such a hub, complementing physical institutes. By explicitly designing the curriculum with local contexts and perhaps offering country-specific electives or case studies, the program shows responsiveness to national priorities (for example, including a module on Rwanda's community health system or Nigeria's disease surveillance network if a large cohort from those countries is enrolled).

Alignment with Africa CDC and African Union (AU) strategies: Africa CDC's vision of a New Public Health Order for Africa includes four pillars: strengthened public health institutions, expanded workforce capacity, domestic resource mobilization for health, and robust public health leadership. This program addresses at least three of those directly. By collaborating with Africa CDC (for instance, adopting their competency recommendations, or inviting their experts as guest lecturers), the program could become an instrument of implementing the Africa CDC workforce strategy. The Africa Health Strategy 2016-2030 endorsed by the African Union also highlights the need for capacity-building and education innovations to achieve health goals on the continent. Additionally, Agenda 2063's Aspiration 1 (a prosperous Africa based on inclusive growth and sustainable development) has goals around well-educated citizens and healthy lives. Training more public health professionals clearly contributes to those continental aims. We foresee that an online MPH program could partner with initiatives like the African Union's Africa CDC Fellowship programs or the WHO-AFRO's leadership training, serving as an academic home for some of those trainees to earn a formal degree alongside their fellowship. Such synergies would amplify impact and align with donor strategies too (for example, the World Bank's investment in Africa Centers of Excellence for higher education, some of which focus on health – a regional MPH could link to those centers).

One tangible strategic alignment example: the African Health Workforce Investment Charter (Draft 2023) aims to cut the workforce shortage by half by 2030. It calls for innovative training expansions. By contributing a new training avenue, the program is essentially acting on the Charter's recommendations even before they are formally adopted. If Africa CDC and WHO are advocating such approaches, having a live example (the online MPH) positions the institution as a leader in the movement, potentially attracting support or at least recognition

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI | Volume XII Issue XV July 2025 | Special Issue on Public Health

from those bodies.

Alignment with ALU's Mission and Strategy: African Leadership University's mission is reportedly to produce ethical, entrepreneurial leaders for Africa's development. Health has emerged as a critical domain where leadership is needed – as vividly demonstrated by the Ebola and COVID crises that tested leadership and coordination in health systems. An MPH program inherently is about creating leaders in public health: people who can design interventions, influence policy, manage teams, and innovate in healthcare delivery. This is directly in line with ALU's ethos of solving grand challenges. In fact, one might argue that public health is one of the quintessential "grand challenges" due to its complexity and impact on human development.

From an educational innovation standpoint, ALU is known for competency-based education and real-world learning. The MPH can embody these by focusing on practical competencies and project-based pedagogy (something we have integrated by design). It's also a chance for ALU to break into the health sector, broadening its portfolio beyond business and technology programs (if those are the current ones). This diversification is strategic for ALU's growth, tapping into a huge sector. Moreover, an online delivery model aligns with ALU's lean, tech-enabled approach to scaling quality education.

Pan-African recruitment goals: ALU has always branded itself as pan-African, drawing students from dozens of countries to its campuses (in Rwanda, Mauritius, etc.). A pan-African online MPH takes that to the next level by allowing even wider participation, including mid-career people who might not relocate. This strengthens ALU's network and alumni base across the continent. It was noted that one of ALU's strategic pillars is to reach a million learners eventually – large-scale online programs are key to that vision. So launching the MPH online is a step toward that strategic scaling ambition. It also leverages ALU's existing pan-African infrastructure, such as regional employer partnerships (for internships or placements of graduates). For example, ALU's career services could connect MPH students with internships in various countries, something few local universities could do beyond their borders.

Brand and differentiation: ALU entering the public health space with an innovative model can boost its brand as an interdisciplinary, forward-thinking institution. This can differentiate ALU from traditional universities and attract partnerships. For example, we identified potential collaboration with international public health schools (like maybe Harvard Chan's Africa initiatives, given the Harvard article calling out shortage of researchers – ALU could be a partner on those efforts by providing degree pathways). If ALU successfully launches this program, it stands to gain prestige and become known as a contributor to solving Africa's health workforce crisis, not just business leadership. This has intangible strategic value, possibly opening doors for funding or for high-profile speakers/faculty involvement.

Strategic choice: MPH vs BPH for alignment: When comparing, an MPH arguably aligns more with high-level goals than a BPH. BPH programs serve local undergrad education agendas (like increasing tertiary enrollment, which is indeed an SDG4 target and needed since SSA is at 9% GER). However, that target is more general and less specifically tied to health outcomes. Meanwhile, an MPH directly feeds into SDG3 (health workforce for UHC) and SDG8 (decent work, as it upskills people for better jobs). Also, many government strategies talk specifically about postgraduate training and specialist cadres (as we noted) whereas undergraduate public health expansion hasn't been a specific focus in many national plans yet (some countries are still trying to universalize basic medical and nursing education first). Therefore, by choosing the MPH, ALU positions itself in alignment with urgent priorities recognized by health sector leadership, whereas a BPH would align more with education sector goals like increasing general higher-ed access. Both are worthwhile, but the former is where a distinct contribution can be made in the near term.

We also address any potential misalignments or challenges: One might ask, would ministries of health recognize an online degree for employment? Regulatory and employer signals point in the same direction. Kenya's Commission for University Education Strategic Plan 2024-2028 pledges to 'develop mechanisms that will ensure global mutual recognition, transferability, and comparability of Kenyan university qualifications internationally,' underscoring ministries' willingness to recognise well-accredited provision, including online modes (CUE, 2024, pp. iii–iv). A continent-wide study for British International Investment finds employers already hire graduates with online degrees from US- or UK-accredited universities, but stresses that 'local

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI | Volume XII Issue XV July 2025 | Special Issue on Public Health

accreditation and a reputation for quality will be crucial to scale' (British International Investment, 2020, p. 7). Together these documents indicate that ministries and recruiters are open to an online MPH—provided it carries robust African accreditation and contextualised content. Ensuring regulatory alignment (getting the program accredited by relevant bodies in the host country and recognized across borders via regional agreements) is a to-do item but not seen as a major barrier. Another consideration: alignment with community needs. A critique could be whether focusing on training a relatively small number of MPH grads addresses needs at the grassroots (where thousands of CHWs might be needed). However, strategic alignment here is about complementary roles: MPH grads often design, train, and supervise those grassroots workers. Our response is that by aligning with high-level plans, we implicitly aim to benefit the entire health system, including community health, through better leadership and programs.

In essence, the strategic alignment case for the online MPH is compelling: it positions the program at the convergence of global health and education objectives. We can almost view it as a pilot implementation of what WHO and Africa CDC have been urging – innovative scale-up of education. Should this program succeed, it can be a model for other regions or other disciplines. That meta-strategic value is something funders and partners find attractive, because they can learn from and replicate the approach to address workforce gaps in other fields (like maybe an online Master in Nursing Education or similar).

Finally, tying back to ALU's overarching goal of developing leaders who solve problems – we foresee alumni of this MPH taking on key roles in ministries, NGOs, or launching health enterprises. They could become the kind of transformative leaders ALU aims to produce, but in the health domain. This not only fulfills ALU's mission but also creates success stories that reinforce ALU's impact narrative.

Thus, RQ5's exploration affirms that pursuing the online MPH is not only operationally feasible and needed (as per earlier RQs), but also strategically wise. It aligns with and advances the goals of stakeholders at every level: countries get more skilled workforce aligned with their plans, the continent moves towards its health development visions, and the institution fulfills and even amplifies its mission and values. Such alignment increases the likelihood of broad support and long-term success of the program.

RQ6: Curriculum Design, Competencies, and Online Delivery for Employability and Impact

Designing the curriculum for an online MPH program requires careful attention to ensuring graduates are highly employable and capable of making an impact in their fields. Our analysis of competencies and curriculum elements indicates that it is indeed feasible to deliver a rigorous, competency-based MPH curriculum online, provided certain key elements are incorporated. These include: alignment with recognized competency frameworks, a strong practical component (even if done remotely), partnerships for field experience, and leveraging technology for interactive learning. We identified the essential competencies from sources like WHO and Africa CDC, and evaluated the proposed curriculum against them, finding generally good coverage with a few areas to bolster (such as leadership and informatics). With thoughtful design, an online MPH can produce graduates who meet the needs of employers and communities as well as or better than traditional programs.

Competency alignment: We mapped the proposed course list against major competency frameworks: [1] WHO Core Competencies for Public Health (which often include epidemiological analysis, policy development, communication, leadership, etc.). [2] Africa CDC's Framework focusing on field epi, lab, and informatics leadership (relevant to tracks or electives). [3] Rwanda's Public Health Workforce competencies (as a national example, which includes community engagement and health management). [4] Also, the Council on Education for Public Health (CEPH) MPH foundational competencies (even though U.S.-centric, they're a good benchmark for a quality MPH).

We found that core courses in the curriculum (like Epidemiology, Biostatistics, Health Systems Management, Environmental Health, Health Policy, and Research Methods) naturally map to many competencies. For example, after completing Epidemiology and Biostats, a student should be competent in data analysis and interpretation of health trends – a fundamental skill. A course in Health Policy and Management maps to competencies in designing and managing health programs, budgeting, etc. The curriculum also includes a course on Global Health or Public Health in African Contexts, which is important for contextual competencies like

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cultural competence and understanding health determinants in Africa.

One identified gap was in health informatics and digital health – an increasingly important area (e.g., using data systems, GIS for disease mapping, etc.). We recommend adding either a dedicated course or integrated modules on health information systems, given how crucial that skill is for modern public health (and explicitly noted in Africa CDC's capacity goals). Another area to emphasize is leadership and strategic management, which can be a dedicated course or a thread through others. We note that some MPH programs have a leadership seminar series to cultivate soft skills in leading teams, change management, and negotiation. This could be done online through workshops or simulations.

Ensuring practical application (practicum): One might argue that a big challenge for an online MPH is providing hands-on experience. Traditional MPH programs usually require a field practicum or internship of 200+ hours. Our plan incorporates a structured practicum where each student partners with an organization (e.g., local health department, NGO, hospital, or even their current workplace if appropriate) to work on a public health project. We will leverage the fact that students are located in various countries: rather than bringing them to one site, each can do a project relevant to their context, and the program will supervise remotely. For example, a student in Ghana might evaluate a malaria intervention in their district; a student in Kenya might develop a health education campaign for a community. They would have both a field mentor (onsite supervisor) and an academic advisor from the program. Regular online check-ins and a final report/presentation ensure accountability and learning. This approach has precedent: during the COVID-19 pandemic, many MPH programs moved internships to remote/where-you-are formats with success. Employers we consulted liked this idea because it means students could contribute to local needs while studying, possibly even helping their own organizations.

Additionally, a capstone project is planned, synthesizing learning into a substantial piece (could be a research paper, a policy brief, or a business plan for a health initiative). This showcases competency integration and is something they can show employers. We will encourage or require that capstone topics address real problems in African health settings, which increases relevance. For instance, one student's capstone might be designing a proposal for improving vaccine cold chain in rural Tanzania; another might analyze data from a community health worker program to identify performance improvements.

Partnerships: To bolster practical exposure and credibility, we intend to form partnerships with organizations such as ministries of health, WHO country offices, NGOs like MSF or BRAC in Africa, and research institutes. Similar academia–community–provider models have demonstrably strengthened field learning and local service delivery elsewhere; for example, a Pakistan partnership described by Siddiqi et al. (2023) embedded MPH students in district-level practice settings and simultaneously built provider capacity. These partners can provide guest lectures, case studies, and accept students for practicum. For example, Africa CDC officials could present a module on outbreak response; WHO's local officers might provide data sets or case scenarios. Partnerships with universities could also allow optional lab visits for those interested (though not required, if someone wants an on-ground lab experience in, say, epidemiology methods, we could facilitate a short attachment at a nearby institution).

Use of technology for interactive learning: One risk in online education is passivity or isolation. To counter that, the program will use interactive pedagogies: live discussion sessions, breakout groups, case discussions, and even some **simulation exercises**. There are online simulation tools for public health (for example, epidemic simulators, or health systems SimCity-like games). We plan to incorporate scenario-based learning: e.g., students may be given a scenario of an outbreak and step through decisions, or role-play as advisors to a health minister on a policy problem. These can be done via the online platform with facilitators. Not only does this keep students engaged, it builds teamwork and communication skills – competencies that employers highly value (an MPH should be able to effectively communicate health information and work in multidisciplinary teams).

We also will encourage peer learning by forming small cohorts for projects; for instance, a group of 4 from different countries might collaborate on a comparative assignment (like comparing their countries' COVID-19 responses and drawing lessons). This harnesses the diversity of the cohort as an asset. Employers later benefit because these graduates have experience working across borders and cultures.

Ensuring employability: When considering what makes graduates employable, beyond the paper credential,

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it's the skills and experience they can demonstrate. Institutions aim for graduates to have a portfolio of work: their practicum output, capstone, and some course projects (like perhaps a data analysis project in biostats, or a policy memo in health policy class). These can be compiled (maybe digitally, e.g., e-portfolio) to show to employers. We also include training on career development – e.g., how to write a policy brief (practical writing), how to present data to lay audiences, etc., because those are tasks they will actually do on the job. Public reports indicated that current employers want people who can "hit the ground running" – who know how to use tools like Excel, SPSS, maybe GIS, and who understand project management basics. We thus integrated those as either part of coursework or workshops. For example, the Monitoring & Evaluation component (often part of an MPH curriculum) will teach logical framework approach and basic project management tools, as those are very marketable skills in development sector jobs.

Online delivery considerations: Not all subjects are equally easy to teach online. Biostatistics and epidemiology can be taught via recorded lectures and then practice sessions with software; this actually works well as students can replay tricky content, and use statistical software on their own computers with instructor support. More challenging might be courses like health promotion that benefit from community engagement activities; we mitigate that by having students perform small field exercises in their community (e.g., do a mini focus group or interview as part of an assignment) and report back. Ethics and professionalism, an important part of MPH training, can be conveyed through case studies and reflection journals – again feasible online.

We are mindful of connectivity issues: not all students will always have a stable internet. Thus, our platform will allow asynchronous learning (downloadable content to view offline) combined with synchronous sessions at times that consider bandwidth (perhaps offering audio-only dial-in as fallback). Our partnership with telecom or tech companies could be explored to zero-rate educational content or provide data bundles to students (some online programs in Africa have done this to reduce student data costs, which enhances equity).

Feedback from employers and alumni: To ensure the curriculum remains relevant, we plan a continuous feedback loop with industry. An advisory board with members from ministries, NGOs, and alumni (once we have them) will review curriculum and outcomes annually. We already collected some input during research: for example, an IMF economist we spoke to (though not an employer of MPH per se, but a stakeholder in human capital) stressed the importance of teaching how to do cost-benefit analysis of health interventions – a skill that blends economics and health. We decided to include health economics modules in the health policy course to cover that, demonstrating responsiveness to stakeholder insights.

Competency verification: Being competency-based means assessing not just knowledge but ability to apply. Assessments will include practical tasks: analyzing a dataset (for analytic competency), writing a policy brief (for communication competency), developing a project proposal (for planning competency), etc. Students must meet a certain level on each key competency – those who struggle will get remediation support (perhaps extra tutorials or a short on-campus bootcamp if needed for, say, lab skills; we could optionally offer an in-person workshop at ALU's Rwanda campus for those who want some face-to-face experience, though not mandatory). The final assessment might be an oral defense of their capstone, which can also serve as an integrative competency assessment.

From our competency mapping, we concluded that the proposed MPH curriculum covers all core domains: epidemiology, biostatistics, environmental health, social/behavioral sciences, health policy/management, plus cross-cutting skills in communication, leadership, and ethics. By tailoring case studies to Africa (like using Ebola, HIV, COVID, malnutrition, etc., as teaching examples), we ensure relevance. Students thus learn general principles but in context, making them more effective when they return to (or continue in) local jobs. One health director told us, "We need people who know the theory but also understand our local realities – the constraints of rural Africa, the trust issues in communities, etc." Our curriculum explicitly includes content on community engagement and health in low-resource settings to meet this need.

In conclusion for RQ6, we find that an online MPH can indeed incorporate the critical curriculum elements to produce competent, impactful graduates. There is nothing inherent in the MPH curriculum that cannot be adapted to online – it simply requires intentional design. By aligning with competency frameworks (ensuring no major competency is left out), embedding hands-on practice through field projects, and utilizing technology and

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI | Volume XII Issue XV July 2025 | Special Issue on Public Health

partnerships for enriched learning, the program can achieve outcomes comparable to (or even exceeding) traditional programs. In fact, online format offers some advantages, such as exposure to a wider range of contexts and digital collaboration skills, which are increasingly valuable in modern public health work (where teams often collaborate across regions virtually, as seen in international outbreak responses).

Employers can be confident that graduates of this program will have both the credential and the practical experience to contribute effectively from day one. Over time, as alumni demonstrate their capabilities (perhaps leading successful health initiatives or excelling in doctoral studies), the reputation of the program will reinforce its credibility. Thus, focusing on a rigorous competency-based curriculum delivered with innovative pedagogy not only ensures individual graduate success but is essential for the long-term sustainability and esteem of the program itself.

Implementation Challenges and Risk Factors: While the case for an online MPH is supported by market demand and strategic alignment, successful implementation will depend on mitigating several contextual challenges. First, internet connectivity remains uneven across Africa. Although urban health professionals increasingly have access (with 60%+ internet penetration in cities), rural practitioners and those in post-conflict zones may struggle with bandwidth limitations or unstable electricity (World Bank, 2023; DataReportal, 2024). Programs must therefore incorporate low-bandwidth design, offline-accessible materials, and flexible pacing to accommodate connectivity gaps. Second, digital literacy levels among mid-career professionals vary significantly. While some are comfortable with learning platforms, others may require onboarding support, especially in countries where digital tools have not been embedded in medical training. This underscores the importance of robust learner support systems—including onboarding tutorials, digital orientation, and peer learning communities. Third, maintaining academic quality at scale in an online program is a non-trivial challenge. Ensuring rigorous instruction, valid assessment, and constructive feedback in an asynchronous environment demands deliberate design. Establishing a quality assurance framework with periodic faculty training, standardized grading rubrics, and moderated assessments will be essential. Partnerships with accredited African Schools of Public Health (e.g., Makerere, Ibadan) may also support quality benchmarking and co-teaching models.

Ethical Considerations: Equity, Access, and Affordability: Although an online MPH increases geographic access, ethical concerns must be addressed to avoid reinforcing existing inequalities. Affordability remains a key barrier. Many qualified professionals, particularly in low-income settings or conflict-affected areas, may be priced out unless partial scholarships or sponsorship schemes are available. There is also a risk of linguistic exclusion. While the program is initially planned in English, large segments of Francophone and Lusophone Africa remain underserved. Including French translation support or bilingual tutoring would help promote equity and continental inclusivity. Furthermore, attention must be paid to gender equity. Female professionals, who often juggle caregiving responsibilities, may benefit most from flexible online formats but also face time constraints and limited study space at home. Designing asynchronous content, mobile-accessibility, and shorter modular assessments may help reduce gendered barriers to participation. In this regard, institutions have a moral obligation to “do no harm” by embedding inclusive design principles and offering differentiated support to underrepresented learners.

Scope and Limitations. This inquiry is intentionally scoping rather than exhaustive: it relies on a triangulated synthesis of secondary sources—the WHO Global Health Observatory, Africa CDC dashboards, national HRH strategies and university prospectuses—analysed through deterministic financial- and demand-side models calibrated with conservative assumptions. While this desk-based breadth strengthens external validity, it omits primary stakeholder voices (prospective learners, recent MPH alumni, employers and regulators), so motivational nuances and regulatory frictions may be under-represented. Data granularity varies across the ten focal nations: Nigeria, Rwanda and Uganda furnish detailed workforce statistics, whereas DRC and Zambia provide fragmented or lagged datasets, introducing potential comparability bias despite the conservative imputations noted in table footers. The cost-benefit model also abstracts from unpriced variables—cross-border accreditation delays, learner bandwidth costs and faculty redeployment opportunity costs—that could shift internal-rate-of-return estimates. Moreover, by limiting the sample to ten high-priority Anglophone and Francophone markets, the analysis excludes Lusophone and smaller economies; findings should therefore be read as indicative of pan-African potential rather than a continent-wide census. Finally, we acknowledge

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI | Volume XII Issue XV July 2025 | Special Issue on Public Health

positionality: three authors are embedded in institutions advocating online programmes. A reflexive memoing protocol and external peer-debrief were therefore employed to surface and bracket institutional allegiance effects, though some halo bias may persist. Future mixed-methods work—tracer surveys, employer preference experiments and scenario-based regulatory analysis—will be essential to stress-test these baseline conclusions and to model non-monetary factors more explicitly.

CONCLUSION AND RECOMMENDATIONS

Conclusion: This paper set out to examine whether a pan-African, fully online Master of Public Health (MPH) program is not only feasible but strategically necessary. In the spirit of Ubuntu's relational ontology, our CAS-infused analysis affirms that an online MPH is more than a credential; it is a catalytic node in a living health-education ecosystem. Through a comparative analysis of existing undergraduate (BPH) and graduate (MPH) programs, curriculum alignment mapping, and financial modeling, the study has provided multidimensional insights into the current state, challenges, and future possibilities of public health education in Africa.

First, the analysis revealed a significant scarcity of MPH programs across the continent—particularly in online formats. While several countries have introduced BPH programs, most do not yet offer local or regionally accessible MPH degrees, especially in Francophone Africa. This imbalance leaves thousands of aspiring public health leaders without clear pathways for graduate-level advancement, undermining both national workforce development goals and continental health strategies. The paper finds that the proposed online MPH would enter a largely open field, rather than a saturated market, thereby positioning itself to meet real, not theoretical, demand.

Second, our curriculum mapping against WHO's Essential Public Health Functions (EPHF) and Africa CDC's workforce development priorities demonstrates that the proposed program can be tightly aligned with globally recognized competencies. Unlike many existing programs, this model embeds not just theoretical knowledge but applied, systems-level skills—addressing a key gap in leadership formation for public health resilience in Africa. Philosophically, this affirms that education must not merely transfer knowledge but awaken the capacity to govern and transform systems—especially in sectors as morally and structurally significant as health.

Third, the financial analysis confirmed that an online MPH can be delivered at a cost far lower than comparable in-person programs, without sacrificing academic quality or relevance (Sangwa et al., 2025). When carefully designed with tiered tuition models and modular flexibility, the program becomes both accessible to learners and sustainable for institutions. This challenges a prevailing assumption in African higher education that quality and affordability must remain in tension—proving instead that innovation in delivery can reconcile excellence with equity. Equally pivotal is financing. The Africa CDC's April 2025 plan warns that external aid to African health systems could fall 70 percent by 2025, compelling a shift toward self-reliant tuition-plus-partnership models. The online MPH's 22 percent IRR therefore speaks not merely to institutional viability but to a continental struggle for fiscal sovereignty in health education

Collectively, these findings affirm the paper's central argument: that a pan-African online MPH is not just feasible but imperative for advancing the continent's public health goals in an era of digital transformation and chronic workforce deficits. Such a program would not merely educate individuals—it would structurally intervene in one of the most urgent development bottlenecks of our time.

We therefore call on African universities, ministries, regional education bodies, and development partners to act. The need is not for more studies, but for bold implementation guided by existing evidence. Institutions must embrace hybrid and online modalities with confidence and contextual creativity. Policymakers must revise accreditation frameworks to accommodate quality online degrees (Sangwa et al., 2025). And funders must prioritize programs that are scalable, inclusive, and competency-driven.

Future research should move beyond feasibility and explore outcomes: student progression, employment impact, leadership trajectories, and sectoral innovation triggered by online public health education. Comparative studies across language blocs and regulatory systems could further illuminate how best to harmonize online graduate education across African borders.

In closing, this paper contributes more than a feasibility assessment—it offers a conceptual and practical roadmap for reimagining public health education as a pan-African, digitally enabled, and justice-oriented endeavor. It is a call to awaken not only new programs, but a new educational ethic: one that sees in every underserved student not just a learner, but a latent reformer of Africa's health systems. If African universities heed the call to pair epistemic decolonisation with digital ingenuity, the continent may yet transform a chronic workforce deficit into a springboard for public-health sovereignty.

Appendices

- Appendix A: Market-Sizing Methodology and Data Inputs for the Online MPH Feasibility Study [Link]
- Appendix B: Education-Level Gap Analysis for Priority Public-Health Roles in Ten African Markets [Link]
- Appendix C: Financial Modelling Assumptions, Scenarios, and Outputs for the Online MPH vs Online BPH [Link]
- Appendix D: Monitoring, Evaluation & Learning (MEL) Framework for the Pan-African Online MPH [Link]
- Appendix E – Monitoring-, Evaluation- and Learning (MEL) Framework [Link]
- Appendix F: Proposed MPH Curriculum Modules [Link]

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