EVALUATION OF PUBLIC HEALTH EDUCATION AND PRACTICE FROM THE PERSPECTIVES OF PUBLIC HEALTH ACADEMICIANS, POSTGRADUATE STUDENTS, AND ALUMNI IN SAUDI ARABIA

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Abstract

Background: According to the Saudi national vision 2030, several strategic plans intersect with the public health goals, for instance, increasing population life expectancy, improving health determinants, and creating healthy cities. Therefore, high demand for more public health-qualified graduates and a better-trained workforce.

Aim: To evaluate public health education and public health practice from the comprehensive perspectives of public health leadership, academicians, and postgraduate students in Saudi Arabia.

Methods: An explanatory phenomenological qualitative method was used, to examine participants' experiences through in-depth one-to-one interviews. In order to structure the responses and develop analytic themes for gathering and interpreting qualitative data by using analyzing app Dedoose.

Results: Thirty-nine in-depth interviews were conducted with MPH current students (n=20), alumni (n=12), faculty members (n=3), and MPH leaderships (n=4) across three universities KSAU-HS, Al-Faisal, and KSU. Many themes emerged from the students' interviews that were grouped into several themes and sub-themes: (1) Motivation of studying MPH, (2) Availability of recourses, facilities, and support, (3) Course content and delivery, and (4) University regulations. During the interviews with the alumni, several significant themes emerged, including (1) advancement in their careers, (2) the absence of certificate classification from the Saudi Commission for Health Specialties, (3) the importance of organizational approval and support, and (4) the need for access to national data for research purposes. During interviews with faculty members and leaders, several themes emerged that shed light on the situation: (1) the student's unwavering dedication to the programs, (2) the impressive educational backgrounds of the students, (3) the scarcity of Public Health majors, and (4) the unfortunate dearth of research funding and support.

Conclusion: improving public health education is critical to producing well-trained practitioners, biostatisticians, faculty members, and leaders. Despite that, the qualitative research we have

conducted offers some essential aspects to be considered in the future, but further investigation is required.

Keywords: Public health curriculum, profession, models, graduate, roles, Saudi Arabia, public health Practitioners, public health education

1. BACKGROUND

During the past century, several worldwide achievements in decreasing mortality and morbidity referred to public health initiatives. The extent to ensure more improvement in the public's health depends on public health practitioners' readiness, which relies upon the quality of education and training (1), (2). World Health Organization (WHO) defined public health as the art and science of structured activities aimed to prevent disease and promote health for societies (3). The important role of public health professionals is associated with building the future health of all populations, locally to globally, with efficient community participation and empowerment. Public health includes diverse skills from the biomedical, social, behavioral, and environmental sciences to engineering, law, and ethics, to tackle complex and challenging health issues (2).

Public health services and activities depend on basic infrastructures, such as human resources. Each public health program such as immunizations, infectious disease monitoring, and injury prevention needs health professionals to assess and respond to community health needs. Public health infrastructure has been referred to as "the nerve center of the public health system."(4) Several studies address the demand for a proactive approach that enhances and support the health sector's role in health promotion and disease prevention. Integrating ecological determinants of health (EDoH) within the public health curriculum, training, and career improvement resulted in support of research and policymaking. Since the COVID-19 pandemic, public health workers provide consistent, informative messages to the public. Furthermore, they provide public education on disaster preparedness through integration efforts between various health sectors. Therefore, these tasks can be challenging during infectious disease emergencies when recommendations change (5).

WHO currently estimated a shortfall of approximately 7.2 million healthcare providers globally, while prediction will escalate to 12.9 million by 2035 (6). Public health education is an essential process to produce public health professionals. The increasing number of public health workers is a challenge for the health system simultaneously, aiming to maintain sufficient standard and quality of the graduates (7). In China review found between 1998 to 2012, public health enrollment was gradually slower than other health science disciplines. Although, new disciplines have been merged, which included epidemiology, health statistics, social medicine, and health policy and management (8). During the COVID-19 pandemic, public health education and the workforce faced several challenges. In China, they exposed the weakness of their educational system of public health, curriculum, teaching, and training for the public health practitioners (9).

In public health education on infection, diseases found that mass and interpersonal communication lead to a positive impact on controlling infectious disease. Mass communication decreases the threshold for disease invasion within the public, while interpersonal communication increases the point for disease invasion. That explains the overwhelming information can cause public panic at the early stage of spreading disease. Interpersonal communication interventions will reduce the threshold for disease invasion (10). Educational qualification is acknowledged by the professional workforce's needs and involves integrating knowledge, skills, and attitudes required for an adequate practice level. Academic competencies are vital to curriculum improvement and evaluation, parallel with education programs, faculty, and scholarship. Depending on the 2003 published report from the Institute of Medicine about the future of public health education, which identified eight significant specialties, included global health, communication, cultural competence, and ethics (11), (1).

There is a lack of studies assessing public health education in Saudi Arabia. In 2018 ministry of higher education released universities in Saudi books to provide a directory of available specialties in Saudi universities and higher education stages (BA, MA, and Ph.D.). In the book, there are 14 out of 30 universities that provide bachelor courses in public health specialties and only five universities offer master's degrees in public health (12). Moreover, among the private universities and colleges, only four institutions offer bachelor courses in public health and only one offers a master's degree in public health (12). Previous studies indicated that there is a shortfall in proficiency in public health organizations, and there is a demand for the improvement of more public health education institutions in the Kingdom of Saudi Arabia. One of the recommendations was to establish advanced courses, specifically in the epidemiology field and claimed that it would contribute to improving the competence of the public health workforce. However, currently, there is a shortage of public health specialties in Saudi Arabia, and previous studies addressed this issue. Only a limited number of universities provide a Master in Public Health (MPH), and that does not satisfy the demand for the public health workforce (13), (14).

Despite that recently in Saudi Arabia released the announcement about renaming the center for disease control (CDC) to the public health authority. This announcement ensures the recognition of public health and its importance and encourages the public to engage in public health recommendations (15). According to the Saudi national vision 2030, several strategic plans intersect with the public health goals, for instance, increasing population life expectancy, improving health determinants, healthy cities, etc. Therefore, high demand for more public health qualified graduates and a better-trained workforce (16).

Due to the importance of the emerging interest and prospects of this profession as vital to the development of public and well-being of the Saudi Population. It is important to assess the perspective of public health current workforce with public health degrees regarding the curriculum and practice. There are no previous reports in Saudi Arabia regarding these issues. For this reason and to be able to make a recommendation for advancement, we observed the following objectives.

1.2. Aim of the Study:
This research aims to evaluate public health education and public health practice from the comprehensive perspectives of public health leaderships, academicians, and postgraduate students in Saudi Arabia.

1.3. Objectives of the Study:
Specific Objectives:
- To assess the viewpoints of public health postgraduate students about the education programs of public health.
- To identify public health faculty and leadership perspectives of meeting the competencies of the curriculum of the public health programs they were teaching.
- To investigate public health graduates' opinions on the impact of the public health programs on their career advancement.

Secondary Objectives:
Verify the challenges and opportunities for public health practitioners

2. MATERIALS AND METHODS
2.1. Study Area/Setting:
The scope of this study covered the main three universities that have postgraduate public health programs or subspecialties of public health in Riyadh, Saudi Arabia, including enrolled students and graduates and faculty members and leaderships of the following universities:

- King Saud University (KSU): Executive Master in Health Promotion and Education (17).
- Al-Faisal University offers three tracks in MPH: Mass Gatherings Health (Hajj and Umrah, Biostatistics and Epidemiology and Health Policy (18).
- King Saud bin Abdulaziz for Health Sciences (KSAU-HS) provides three tracks in MPH: Community and Environmental Health, Biostatistics and Epidemiology and Health Systems & Quality Management (19).

2.2. Study Subjects:
All students or graduates of public health MPH of the above-mentioned universities and public health faculty and leadership of the departments and institutions.

2.3. Study Design:
An explanatory phenomenological qualitative method used, to examine participants' experiences through in-depth one-to-one interviews; which provided a better understanding of the research objectives.

2.4. Sample Size:
Individual in-depth virtual interviews were conducted with most of the participants and some interviewed in person. Individual interviews were conducted with current students (n=20), graduates (n=12), faculty members (n=3), and higher rank administrators such as program directors (n=4). Thirty-nine participants were interviewed separately the details of the participants are presented in (Table1).

Table (1): Study Participants

Universities	Students	Alumni	Faculty	Leaderships
KSU	9	No graduates yet	-	1
Al-Faisal	1	3	-	1
KSAU-HS	10	9	3	2
Total	20	12	3	4
Grand total	39 participants			

2.5. Sampling Technique:
A snowball sampling technique used to contact participants in the MPH alumni category from each public health program in the three universities. Regarding students' participation based on their availability and willingness to express their perspective on studying MPH. Faculty members and administrators were contact through email correspondences, telephone calls to schedule the interviews. Moreover, several visits done to the three colleges to promote the research goals and attracted participants. Also, reached the target group through social media platforms by joining multiple public health groups through WhatsApp, LinkedIn, Email and Telegram.

2.6. Data Collection methods, instruments used, measurements
A semi-structured open-ended questionnaire used to have the participants' perception of public health education in Saudi Arabia. The questionnaire (Appendix. A) Is based on a published study has similar objectives and we adjusted it to the Saudi Arabian environment (20) , (21) . Combined with a validated competencies list provided by the "Council on Linkages between Academia and Public Health Practice." (22)

2.7. Data Management and Analysis:
Considering Covid-19 precautions, most of the interviews were conducted through Zoom or Microsoft teams and it all recorded, only few interviews held in-person with the program directors depending on the preference of the participants. Most of the interviews conducted in English and only few were

in Arabic. The recorded interviews were transcribed using speech to text programs. In order to structure the responses and develop analytic themes for gathering and interpreting qualitative data by using analyzing app dedoose.

2.8. Ethical Considerations:

The approval to conduct the study obtained from King Abdullah International Medical Research Center KAIMRC, KSAU-HS IRB Approval Serial Number: SP21R/161/04. All participants gave verbal consent for the interviews it was voluntarily and they were all aware of the objectives. The responses were digitally recorded and ethically insuring the anonymity and confidentiality of the participants.

3. RESULTS

3.1. Characteristics of the Participants

Thirty-nine interviews were held face-to-face and online, (Table 2) presents the descriptive statistics for the participants' demographic data. In depth interviews were conducted with MPH current students (n=20), alumni (n=12), faculty members (n=3) and MPH leaderships (n=4) across three universities KSAU-HS, Al-Faisal and KSU.

**Table 2. Demographic characteristics of the participants**

Demographic variables		Participants			
Variables	Categories	Students n= 20	Graduates n= 12	Faculty members n=3	Leaderships n=4
Age (years)	Average	28	33	42	45
Sex	Male	40%	50%	100%	75%
	Female	60%	50%	-	25%
Nationality	Saudi	100%	100%	33%	100%
	Non-Saudi	-	-	67%	-
Subspecialty in Public health	Epidemiology	15%	33%	67%	25%
	HSM	25%	25%	33%	25%
	Community health	15%	17%	-	-
	Health policy	-	25%	-	25%
	Health promotion and education	45%	-	-	25%
Employment	Unemployed Employee	5% 95%	- 100%		

Figure (1): Current Students and Alumni Background Before Seeking a Degree in PH

Majors Before MPH

■ MPH Holders   ■ Currently Enrolled in MPH Program
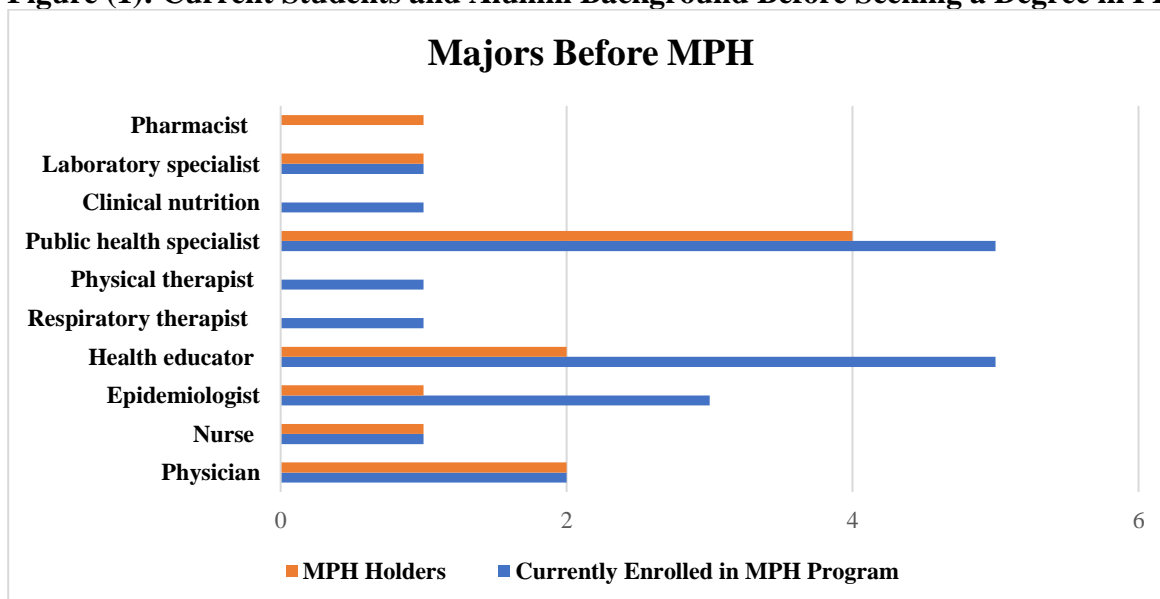
In figure (1) it shows the participants (n=22) majors before enrolled in MPH most of them were public health specialists and health educators.

Figure (2): The Participants' Organizations
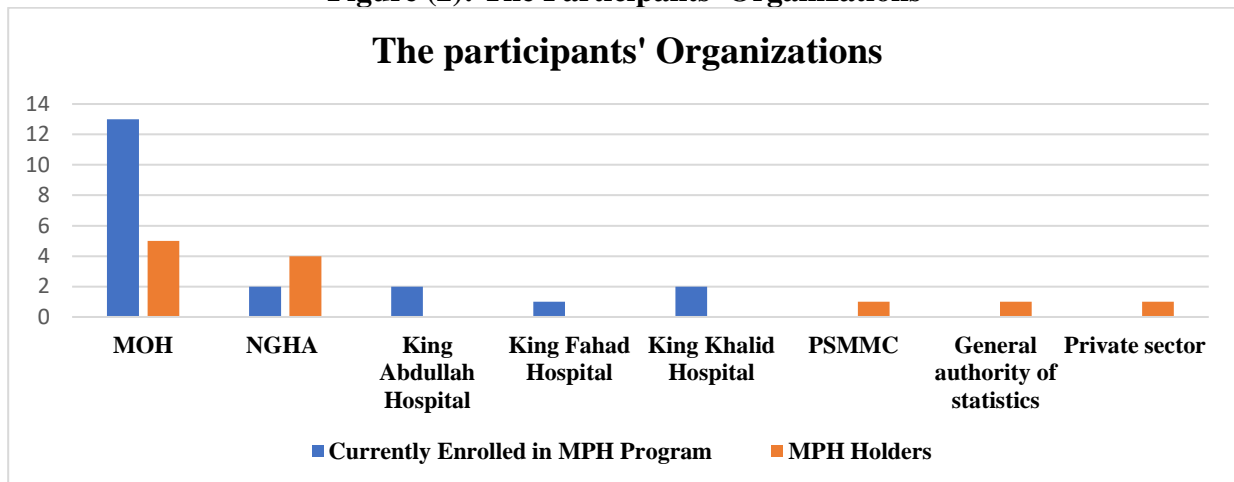
In figure (2) it illustrates the students' and alumni's working organizations (n=22). The majority were already working for ministry of health.

3.2. One-to-one Interviews with the Current Student

Many themes emerged from the data collected during face-to-face interviews that were grouped into two major themes and sub-themes: (1) Motivation of studying MPH sub-themes they were motivated because (more job opportunities, working with the community and SCFHS restrictions limit students' preferred majors). (2) Availability of recourses, facilities, and support, sub-themes (shortage of technical support and whether they received advancing and guidance). (3) The content of curriculum, and (4) University regulations, shown in (Table 3).

3.2.1. Motivation of studying MPH
The Job Market and Opportunities

The majority of the students agreed on obtaining MPH degree will increase their chances to have better job offers. As one of the students stated, **"MPH will provide me with a high chance to have a better job…"** Some believe they will be privileged since the public health field is new and the high demand for public health practitioners in Saudi Arabia. However, one of the participants thinks that MPH will not benefit him financially but still interested and keen to learn **"Although it will not add any benefit to my current professional development as well as financially but, I want to sharpen my skills in this area…".**

Working with the Community

Some of the participants motivated by the message of public health, the impact of effective public health interventions reaches the whole community, **"**I want to help not only one patient. But I want to help the entire community**"**. Others think public health is their interest **"**I found that PH is very interesting**"**. While others who work in a clinical institution and they are shifting to public health mentioned, **"**I have tried the clinical part but I didn't find myself there**"**.

SCFHS restrictions limit students' preferred majors

The Saudi Commission for health specialties (SCFHS) controls and limits most of the MPH candidates to specific majors. Many of the participants claimed they chose MPH due to SCFHS. One of them stated, "I have to choose either epidemiology or public health", other said, "I have 2 options either I seek a degree with the same specialty or HSM".

3.2.2. Availability of Recourses, Facilities and Support
Shortage of Technical Support
Most of the students lacked access to the statistical software such as SPSS and Endnote, as one of them stated **"**SPSS and endnote were not available although most of the courses depend on it**";** another said **"**I had to purchase it myself ..**"** While in other university KSU students were satisfied with the recourses they obtained, two of the students stated, **"**They provide us with access to the library King Salman library which is one of the best libraries...**".** Moreover, students lack to use the facilities**,** because of the pandemic covid-19 most of the courses conducted virtually **"**Online studying was an extraordinary situation we didn't have the chance to explore the resources and facilities...**".**

Receiving Advancing and Guidance
The major responses agreed the faculty members were available to guide and support the learning process. However, some faced difficulties to reach some of the professors during the virtual classes **"**they were very cooperatives, supportive, available but you can't reach out for some of the faculty members...**".**

The Content of Curriculum
The students' perspectives differ we had two major conflicting subthemes from the students in the health care profession who responded that the curriculum is beneficial and increase their level of knowledge in PH. While students from PH background claimed that, the curriculum was repetitive from their previous knowledge and there are no upgrades. The majority of the participants agreed it was hard to understand biostatistics and epidemiology online. While others believe **"**the content focused on the current public health issues and very informative**"**. On other hand, some think the execution of the program should be practical not just theoretically implemented, **"**the name of the program executive is not reflecting the reality the way of teaching and requirements are purely academic program**"**. While other student mentioned, **"**our master is executive it was mixed between the academic and executive master**".** For the assessment criteria, most of the students prefer projects and practical requirements to exams. One of the students mentioned, **"**I didn't like the exams and finals we need more projects...**"**

University Regulations
We noticed a pattern in one of the universities that practices segregation between females and males in the classroom. Most of the female's responses mentioned that there is unfairness; one of the participants said **"**A huge difference between dealing with females and males**".** In addition, the participant clarifies the unfairness points by mentioning: **"**There's a lot of facilitation for males than for females regarding the assignments grading, exams, and the requirements...**"**

Table 3. The Themes and Subthemes of Student's Responses

Group themes	Subthemes	Categories	Sub-categories	Supportive quotations
Motivation studying MPH	Job opportunities	Working with the community	Work with public health 2030 projects	"MPH will provide me with a high chance to have a better job…"
Resources and facilities	covid-19 limited access (virtual)	No access to EndNote and SPSS	Advancing and guidance were there	"SPSS and endnote were not available…"
courses' content and delivery	Knowledgeable and detailed	not recent	Practical engage students to learn better	"discussion with students provide us with the new perspectives"
Suggestions and changes	The assessment criteria	No quizzes, midterms finals	Work on creating a policy and procedures	"Do visit field and meet interesting people in the field make it interactive with the reality"

Distance learning classes (Online)	efficient during the pandemic	technical issues	Poor connection and interactions	"In online I didn't see that instructions and the sharing of stories and experiences"
Career intentions, and expectations after graduation	Seek Publication	Pursue PhD	Being part of transformation in e-health in KSA	"I'm thinking about taking PMP & PH courses on how to implement strategic plan"
Knowledge applicability	To certain extent it's applicable	Increase authorities that support PH	The mindset of the community change to prevention	"Now PH more applicable in real life"
Organization support professional development	Very Supportive environment	No struggles noticed	Help to growth and improvement	"my work environment was very supportive"

3.3. One-to-one Interviews with Alumni
Many themes were noticed in the interviews with the alumni regarding their career's advancement (1) Promotion and job opportunities, (2) Lack of the certificate classification from Saudi Commission for health specialties, (3) Organization Approval and Support, and (4) Access National Data for Research Purposes, (Table 4).

3.3.1. MPH Graduates
Promotion and Job Opportunities
Most of the graduates were working during studying MPH but after graduation, some of them obtained other job opportunities. About one third of them received a promotion and seeks a career in another organization. For example, one of the graduates said about his colleagues **"they work at famous companies related to public health"**; **"I know 2 of them get a job in KAIMRC"**. While one of the graduates mentioned, **"After I graduate I'm now working with the Ministerial Committee of Traffic Safety"**. Few of the graduates obtained higher positions, as one of them stated: **"I know people who get hired in the authority of the statistics and some people who work at the health holding company. Which is responsible for the vision 2030 for the ministry of health."**

Many alumni ensure they are promoted after graduation **"most of them get promoted; I find my position in the quality and leadership department"**. However, some graduates believe geographical areas play a role in job opportunities **"my colleagues have better opportunities because they are in Riyadh and I'm in the western region I don't have the same privilege"**.

3.3.2. Lack of the certificate classification from Saudi Commission for health specialties
Some of the graduates argued the poor benefits from MPH are due to **"some of them didn't have the certificate approval from the Saudi Commission for health specialties"**, **"I didn't get any benefits"**. Others remain in the clinical field after years of graduation aiming to change **"I will seek to change this position"**.

3.3.3. Common Themes between Students and Alumni across all Universities
Time Management
Most of the participants were employed and studying full-time program many agree the main challenge is time management as one of the participants explained **"Managing my time effectively was an issue…"**

Organization Approval and Support

Approval from the employer to study MPH is required for the candidates from KSAU-HS and Al-Faisal University but not required from KSU. Approximately two third of the participants agreed their organization supported them and they were cooperative as one of them stated, **"To peruse my master they supported me and they give me their approval"**. On the other hand, some faced challenge seeking their approval and support **"I'm not sure 100 percent they support me…"**

Background before PH

The educational background affects the knowledge application most of the students agree one of them said, **"Yes MPH applicable but not 100 percent"**, another said **"it depends on the public health practitioner and the institution if it's clinical institutions it hard to apply my knowledge I have to leave my current job"**. While few of the responses lack the PH, background leads to challenges with biostatistics and epidemiology courses.

Access to National Data for Research Purposes

The majority faced difficulties accessing data for their thesis, one of the graduates stated, **"The researcher suffering in accessing medical data based on his/her research, especially the lack of cooperation of some doctors specializing in some of the diseases that are being researched".**

Career Counseling

Some of the participants pointed to a lack of structured career counseling they graduated without the least knowledge where they can work **"We didn't have a clear vision after graduation a lot of resources and teaching invested in us but after graduation, I didn't work in PH field"**. Especially for those who came from different backgrounds. Moreover, there is no career center in the investigated colleges.

Lack of Field Experience

Most of the participants suggested practicum courses except Al-Faisal university students who already have practicum as part of their curriculum.

Table 4: The Themes and Subthemes of Alumni's Responses

Group themes	Subthemes	Categories	Sub-categories	Supportive
MPH experience	New field	Aligned 2030	Research skills	"it was a wonderful and fruitful experience"
Challenges of the program	pressure and stress	Time management	Requirements	"Combining studying and working 2 jobs is very hard"
Strengths	Gain research skills	Analyzing data	Interpretation of findings	"I gained a lot of skills regarding research"
Weakness	No practicum	Lack Certificate classification	lack of a biostatistician	"And after we graduate in 2017. Till now I didn't get to my License"
Graduates from the program	The majority working	Job opportunities in PH filed	Career path	"small percentage of them got a job in the field of PH"
Suggesting changes in the program	Access to data	collaborations with hospitals	Practicum	"I hope this data can be easily accessed"
Distance learning classes (Online)	Not efficient for research courses	Lacking interactions	Knowledge gap	"Biostatistics is better not to be online classes"
Knowledge applicability	PH is community health	Wide range of applying PH in real-life	PH about prevention and promoting health	"Yes, is applicable and important"

3.4. One-to-One Interviews with Faculty and Leadership

Several themes merged after conducting interviews with faculty members and leaderships (1) the students' commitment to the programs. (2) The Students' educational background (3) Lack of research budget and assistance, (4) Limited PH majors, and (5) Public health education during Covid-19, see (Table 5).

Table 5. The qualifications of the MPH faculty and leadership

Experience in teaching public health	Education	Academic job title
7 years of teaching	PhD in PH, US concentration on HSM	Professor
10 years of teaching	PhD in Epidemiology, Finland	Professor
15 years of teaching	PhD in Health Education, UK	Program director
5 years	PhD in Epidemiology, US	Program director
+10 years	PhD in Mathematics US	Professor
12 years	PhD Public Health UK	Program director
7 years	PhD Public Health US	Program director

3.4.1 The Students' Commitment to the Programs

The students' performance depends on multiple factors the motivation of studying MPH and their background. One of the professors mentioned, "On an academic level, it varies. Because you know, it depends on the student's background…. ". Overall the students' performance was satisfying one of the professors stated, "My experience with the students is excellent. They showed high commitment. High interest to understanding the public health sciences". While other professors have different experiences, they claimed the students were poorly committed because its full-time program for part-time students stated: "I was expecting more of the students. I was shocked of the level of the students". Most MPH programs are full-time but the candidates usually working, one of the professors stated "for the last 10 years my observation with such a program for our clients. It might be good for them to have a full-time student instead of part-time student". To decrease the dropout rate "I want the program to be paid most students will be motivated and the work supported the students…" Moreover, increase the credit hours to include practicum to the curriculum and biostatistics courses, as the professor added, "Increase the credit hours for teaching the biostatistics …"

3.4.2 The Students' Educational Background

The faculty members noticed students with clinical background have resistance to the public health message and confuse the curative with the preventative approach. One of the professors said," shifting the paradigm from the hospital-based to community-based it felt like the student have resistance..." The majority of the faculty thought the educational background determines the performance of the students.

3.4.3 Public Health Education during COVID-19

Most of the responses agree that public health is a young field in Saudi Arabia but the precautions to prevent spreading the disease is a huge investment. Before 5 years, public health is barely known but now after the pandemic, it gets recognition on multilevel one of the leaderships added, "Now we have independent agency of public health…" During conducting this current study, the educational mothed was virtually which affect the quality of education. The majority agreed online classes were acceptable for most of the courses except statistics courses "other courses it's difficult to implement online. For example, the methodology and the research"

Research Budget and Assistance

One of the major weaknesses in the PH system is lack of the investment in PH issues and most of the students' researches around clinical areas. To strengthen the system there is high demand to access data and research to establish the interventions on a solid base. One of the leaderships stated,

"**Unfortunately, the budget cuts and research assistances limited....**" and most of the faculty mentioned limited research financial support from the institution or outside.

Shortage of public health practitioners

Three of the leaderships mentioned the lack of qualified of public health practitioners, as one of them explained "**we have a few people specialized in public health, who have PhDs with a good experience. So, this is a major challenge**". Moreover, most of them mentioned lack of diversity of PH majors that were taught.

Table 6: Faculty and Leaderships Responses

Group themes	Subthemes	Categories	Sub-Categories	Supportive
Expectations from the students	hospital background	Working students	full-time program for part-time students	"Most of them yes. Unfortunately, there are a few of them did not."
Faculty development	Available	Requesting more training	Considering the faculty needs	"But there is still room for improvement"
Strength of the program	Diversity in the teaching the staff and students	the research area	Collaboration with various institutions	"one of their strength is our students"
Weakness	No research databases	Research budget	Lack of research support	"the opportunity for improvement is the research support"
Teaching MPH in Saudi Arabia	New field	education sector and also practice sector	Lack of awareness about PH	"the most difficult challenge to raise awareness of PH awareness Among people and policy makers"
Suggesting changes in the program	practicum requirements	Visit PH institutions	Ministries, PH agencies	"I wish to see practicum and for the program to strength the skills of the students"
Online Classes	blackboard system is excellent	Upload and communicate	Access anywhere but lack interactions	"Online teaching is a good thing but. It should not be a permanent"
Graduates reputation	well received	have high level jobs	MOH, Saudi FDA and PH agency	"We've conducted Alumni reach out. I think most of them they have jobs. I think our program is very good..."

4. DISCUSSION

To our knowledge, this present study is the first qualitative to examine public health education from a comprehensive overview through interviewing postgraduates' students, and alumni, and faculty and their leadership in the main three universities in Riyadh, Saudi Arabia.

In the last decade, the literature about public health has grown gradually. In addition, the number of academic institutions, which offer public health programs, increased worldwide and locally in Saudi Arabia. On the other hand, the most critical aspect is the quality of education because public health education is the cornerstone of preparing public health professionals.

Moreover, education ensures adequate qualifications that are needed in the workforce. Therefore, the Institute of Medicine (IOM) convened a Committee on Educating Public Health Professionals for the 21st Century. They examined the needs of public health professional education and developed a framework on education, training, and research in programs and institutions of public health to strengthen and prepare future public health professionals to improve population health (23).

In this current study, we discovered that many agree that public health is a new field and needs to be strengthened by graduating more public health practitioners and recruiting them in the appropriate agencies such as MOH, SFDA, and public health agencies.

Barriers
Despite the enormous need for an adequate public health workforce in Saudi Arabia, health institutions face a shortage of public health professionals. Most of the interviewed leaders addressed that they need to recruit more public health professionals, but there is a shortage of qualified people and a limited number of PhDs in public health. Moreover, until now, no university offers Ph.D. in public health in Saudi Arabia. Furthermore, another public health leader pointed on the lack of diversity of public health sub-specialties, and he mentioned over twenty majors he claimed are still lacking programs offering them. He listed specialties that we need in Saudi Arabia, including public health, biostatistics, epidemiology, health environment, food safety, occupational health, health education, infection control, health behavior, demographic and census, child health and reproductive health, school health, administrative and health policy, public health policies, disaster management, international health, geriatric health, mental health, and ethics of medicine.

Quality of Teaching
The public health initiative was established in 1872 when the American public health association was founded. The first independent School of Public Health (SPH) started in 1916 in the United States (US). SPH helped to define and list the public health profession (24, 25). In 2010, the Association of Schools of Public Health in the European Region (ASPHER) estimated there were about 450 schools of public health worldwide irrespective of their qualification as SPH. These associations are dedicated to strengthening public health's role by focusing on the education and training of public health expertise in both areas of practice and research (26). Locally, Saudi Arabia adopted the proactive approach back to the Alma Ata declaration in 1978, when MOH developed Primary Health Care (PHC) (27).

In the present study, most of the participants were satisfied with the quality of teaching and praised the qualifications of the faculty members. At the same time, some think the delivery of some courses could be improved. This opinion is firmed around the fact that there is a shortage of qualified faculty members. Meanwhile, public health in the Middle East faces the same challenges in recruiting adequate skills and expertise, considering both quality and quantity (28). However, the professional development of the faculty was one of the indicators and among the understudied three universities. All of them have their own independent department to organize and conduct the courses regularly. At KSU, they have a deanship for skill development, which is responsible for strengthening and sharpening the faculty skills. In KSAU-HS, they have the advantage of having KAMARAC, a research center, training centers, postgraduate training centers, and free accessibility of courser for courses. While in Al-Faisal University, the MPH program director claimed it is an environment that promotes faculty development, which means they provide training regularly.

Resources and Sustainability
Most of the participants struggled because they didn't have access to statistical software such as SPSS and Endnote, and they thought it was one of the program's weaknesses. Other than that, most of the textbook and library services were available. However, during the lockdown and the virtual learning classes, most of the respondents said they could not discover all the facilities and recourses the campus could provide.

International/ Local Academic Collaborations
The faculty and leadership who participated in this study encourage partnership and collaboration with local or international public health institutions. In KSAU-HS, the curriculum is similar to the University of Liverpool's curriculum. In addition, considering some updates based on the needs of Saudi Arabia context and feedbacks from the students about modifying the courses. Of course, like any curriculum, they need to update it based on the country's needs and the professionals. KSAU-HS got accreditation from the ministry of high education and the Saudi consul for medical specialties

practically for the epidemiology program. They also seek to get more accreditations from international such as the German Institute for Accreditations health programs (29).

In contrast, in KSU, Executive Master in Health Promotion and Education was established locally and has been developed over three years. It went through many processes through the international universities' benchmark, which delivered the same program. It is approved by the deanship of the graduates, and the university consul in KSU. In Al-Faisal University, a study of needs assessment revealed the need for an MPH program with majors in mass gatherings health, health policy and management, and biostatistics and epidemiology. As a result, MPH program was designed to cover these needs, specifically the mass gatherings health concentration (30).

Public Health System in Saudi Arabia
Most participants mentioned that public health is a new field and still growing, and they praised the public health authority. They also believe that public health recommendations regarding COVID-19 precautions are smoothly applied in society and the population more to comply than other countries when it comes to the common interest. For example, Tawakkalna is the official Covid-19 application in Saudi Arabia to prevent the spread of the Covid-19 virus (31, 32, and 33). The app launched several important services such as clarifying the health status of its users through colored codes, immunization status, and displaying other governmental documentation. The citizens should have active Tawakkalna to enter the workplace, supermarkets, schools, movie theaters, etc.

However, a cohort study conducted in China assessed the association of public health interventions with the epidemiological features of the COVID-19 outbreak in Wuhan, showing decreased rates of confirmed cases after implementing public health measures (34). In contrast, some countries, USA and Italy faced challenges during the implementation of preventative measures since their citizens were not obligated to follow the public health instructions(35, 36). Therefore, all leaderships commented on precautions during Covid-19 in Saudi Arabia were superior compared to other countries.

5. STUDY LIMITATIONS
The findings of this study cannot be generalized to the target group of public health professionals due to the small sample size. We did not include the perspective of other stakeholders such as MOH and local public health agencies since it might differ from the findings. Furthermore, some participants were nervous to elaborate about their opinions because the interview was recorded they were more willing to speak off record.

RECOMMENDATIONS
Based on the finding, most of the student participants mentioned they suggested increasing practicum courses, community involvement, and field experience. In addition, they want the programs to focus more on the research area and projects than on the exams. By opportunities for research and projects & access to the national databases. While most of the alumni agreed, they need to engage in community activities, one of them suggests optional courses or additional courses during the summer breaks for the students to improve themselves. Regarding to research skills, biostatistics provides courses to help sharpen the students. Moreover, there should be a collaborative effort between with public and private sectors and the university so they will benefit from the alumni's knowledge and experience and get involved in real statistics. This will facilitate access to the national data for research purposes. While faculty and leadership request research, financial support allocation of a large budget for PH practice.

6. CONCLUSION

From the findings of the study qualitative explanatory, no research found has evaluated the available public health education universities in Saudi Arabia. There is a need to improve public health education, which is critical to produce well-trained public health practitioners for the country. Aligned it with the Saudi 2030 vision, which also stresses the need for more PH practitioners to fulfill this vision we need more PH.

The findings of study can be used as initial evidence to improve this curriculum, fill the gaps, and improve the programs we recommend further evaluation of the programs and elevated them to higher degree and considered a PhD in public health.

7. DECLARATIONS

This research dedicated to all public health professionals in Saudi Arabia.

7.1 AUTHORS' CONTRIBUTIONS

Nouf Alaklabi carried out the interviews and wrote the manuscript with support from Dr. Hoda Jradi who supervised the project. Sayed Shahbal helped to make corresponding with journal and formatting the manuscript.

7.2 ETHICS APPROVAL

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9. APPENDIX

9.1. Appendix A: Questionnaire

(A) Questions for Faculty and Leaderships:

- Can you talk about your experience in teaching public health? (probes: previous education, work, duration of teaching, expectations from students)
- Can you talk about the delivery of the curriculum, course materials and other resources available for teaching?
- Can you tell me about faculty development?
- Can you tell me about the strength and weakness of the current program?
- What has been the most difficult part in teaching public health in Saudi Arabia? How do you deal with it?
- Do you wish if something done differently regarding (the conducting of the program training, what it would be? (Talk about what would you need to make these changes?)

- How do you feel about distance learning classes (online / virtual)? (Probes: Offering them? Receiving information using this methodology?)
- Can you talk about your graduates? (Probes: reputation, how do they compare with others?)
- Would a partnership with international universities would be valuable? How so?
- What do you think of the system of public health in Saudi Arabia?

Additional questions for Leaderships:
- Can you tell me about your experience in developing/running a school of public health/dept. of public health? What are the challenges?
- Would you be interested in collaborating with international schools of public health for enhancing the public health training? What form would you prefer that it take (e.g. modular, visiting faculty....)?

(b) Questions for Students
Demographic Section:
- Age/ Date of birth:
- What is your current subspecialty of public health?
- What is your current employment status?
- What is your degree before public health?
- Can you tell me about your motivation studying public health program?
- Can you talk about the resources and facilities available on campus? (probes: faculty hours, library, internet and computers)
- Can you talk about the program so far? (probes: courses' " materials" content and delivery, challenges, strengths, how program has met your expectations so far)
- Please tell me about things you would like to see being done differently?
- Can you tell me about the amount of assignments and projects you did, were it efficient and useful?
- Please tell me what do you think about distance learning classes? (Online Classes)
- Can you please elaborate about your career intentions, and expectations after graduation?
- On your point of view do you think what you are studying is applicable in real-life situations?
- Where your professional development does extends to? (Future goals) (Did your organization support that?)
- Can you please rank public health regarding importance versus other health sector professions?
- Can you summarize your experience of studying MPH so far?

(c) Questions for Alumni
- Can you tell me about your MPH experience?
- What were the main challenges? Talk about how you dealt with it?
- Tell me about the program? (strengths and weakness)
- Tell me about graduates from the program. (probes: what do they do after completing the program)
- Can you talk about what you would like to see changed in the program? In addition, how these changes might take place?
- Please tell me your thoughts on distance learning classes? (Online Classes)
- On your point of view do you think what did you study is applicable in real-life situations?
- Can you please rank public health regarding importance versus other professions?

9.2. Appendix B: Ethical approval letter

Kingdom of Saudi Arabia

Ministry of National Guard - Health Affairs

المملكة العربية السعودية

وزارة الحرس الوطني - الشؤون الصحية

King Abdullah International Medical Research Center (KAIMRC)

IRB NCBE Registration No.: **H-01-R-005**

☎ (84) 94456   ✉ 1515   📠 94466   irb@ngha.med.sa

IRB Office   Memo Ref.No. IRBC/0966/21   E-CTS Ref. No.   RYD-21-419812-67586

Study Number: **SP21R/161/04**
Study Title: **Evaluation of Public Health Education and Practice from the Perspectives of Public Health Academicians, Postgraduate Students and Graduates in Saudi Arabia**
Study Sponsor: **Non grant**
IRB Approval Date: **06 May 2021**
IRB Review Type: ■ **Expedited Review**   ☐ **Full Board**
Study site(s):   **Central Region**

Dear **Dr. Hoda A Jradi**
Associate Professor College of Public Health and Health Informatics, KSAU-HS
Ministry of National Guard – Health Affairs

Sub-investigator/s – Nouf Mohammed Alaklabi

After reviewing your submitted research proposal/protocol and related documents, the **IRB has APPROVED** the submission. The approval includes the following related documents:

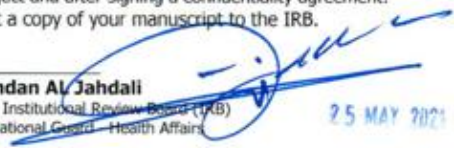| Document/Title	Version	Date
Research Proposal	01	06 May 2021
Data Collection Form	01	06 May 2021
Inform Consent Form	01	06 May 2021

The approval of the research study is valid for **one year** from the above approval to expiration date.

Terms of Approval:
- **Annual Reports:** An Annual report must be submitted for approval to avoid termination/suspension of your research.
- **Financial report:** If your study is funded project, details financial report should be submitted with the scientific report.
- **Final Report:** After completion of the study, a final report must be forwarded to the IRB.
- **Retention of original data:** The PI is responsible for the storage and retention of original data pertaining to the project for a minimum of five years.
- **Reporting of adverse events or unanticipated problems:** The PI is responsible to report any serious or unexpected adverse events or unanticipated problems, which could involve any risk to participants or others, or any event on incidents that may have impact on the research or participants.
- **Biological samples:** No biological samples to be shipped out of the Kingdom of Saudi Arabia without prior IRB approval.
- **Participant incentives:** No financial compensation or gifts to be given to participants without prior IRB approval.
- **Storage of biological samples:** All biological samples collected for the purpose of this research must be stored in the KAIMRC related repository.
- You will need to resubmit the proposal to the IRB for review and re-approval before implementing any changes to the approved proposal.
- It is possible that the IRB may decide that the proposed new changes may exclude the proposal from being accepted for exempt review.
- It is your responsibility to safely store the data collected.
- Please note that phone based surveys are not permitted.
- If your approved proposal requires access to Bestcare, please write to the IRB informing them of the name of the designated data collector and exactly define the period requested for collecting data. Do not start the data collection until an approval memo is issued from the IRB giving permission to that collector to start accessing Bestcare for the duration of the project and after signing a confidentiality agreement.
To submit a copy of your manuscript to the IRB.

Prof. Hamdan AL Jahdali
A/Chairman, Institutional Review Board (IRB)
Ministry of National Guard – Health Affairs

2 5 MAY 2021

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