

ADDITIONAL PUBLIC HEALTH COMPETENCIES REQUIRED BY PUBLIC HEALTH GRADUATES TO HANDLE PUBLIC HEALTH EMERGENCY OF INTERNATIONAL CONCERN

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ABSTRACT

COVID-19, a public health emergency of international concern, had brought an enormous strain on our fragile and overburdened public health systems. Having a competent public health workforce is a key attribute to mitigate the shock and disruptions that such pandemics pose. We aimed to elucidate the additional key public health competencies which would be required by the public health graduates, post COVID-19 pandemic, to handle such public health emergency of international concern. Three separate focused group discussions were conducted. The first and second groups consisted of all students pursuing first and second year Master of Public Health program from an Indian Institute respectively. The third group was heterogeneous and consisted of all teaching faculty in an Indian institute imparting public health training; and public health professionals working in governmental sector, non-governmental organizations and corporate social responsibility foundations in India. The sampling method used was purposive for participants from governmental, non-governmental sectors, and Corporate Social Responsibility foundations. After obtaining voluntary informed consent, the focus group discussions were recorded, and transcribed. Themes were coded and analyzed using the NVivo 12 software. Social media engagement, adaptive agility in utilizing information technology, systems thinking, community empowerment, communication skills with empathy, data visualization and interpretation, community based participatory research skills, managerial skills with the mind set of an entrepreneur and program planning skills

were the additional key public health competencies required by the public health graduates to handle public health emergency of international concern.

KEY WORDS: public health public health emergency of international concern

INTRODUCTION

The advent of COVID-19 has brought about a sea change in how public health professionals must respond to emerging threats. Uncontrolled epidemics occurring over the last decade, which have the potential to become major pandemic events, have highlighted the need to understand how to govern health systems in the face of grave and unpredictable shocks. Having a competent public health (PH) workforce is a key attribute to mitigate the shock and disruptions that such pandemics pose. One of the most vital and pressing components of the triple billion strategy set by the World Health Organization is a target of protecting one billion more people from health emergencies. To achieve this target, a competent public health workforce trained in holistic pandemic preparedness is required [1].

Academicians and PH practitioners have developed a curriculum for PH training using the public health preparedness and response core competency models [2]. Core competencies were recognized for the Master of Public Health program in 2006 by the Association of Schools of Public Health (ASPH), USA [3]. The Public Health

Agency of Canada has listed 36 national public health core competency statements in seven broad categories- public health sciences; assessment and analysis; diversity and inclusiveness; policy and program Planning; implementation and evaluation; partnership, advocacy and collaboration; and leadership and communication [4]. Similarly, the Model Curriculum Handbook, Government of India for Masters in Public Health (MPH), and the ASPH, USA, have enlisted core competencies in epidemiology, biostatistics, environmental and occupational health, health systems and policy analysis, and social and behavioral sciences domains [5,6,7]. In addition to the aforementioned core competencies, cross-cutting competencies are required by the public health workforce [8].

To facilitate practical skill development, both formal learning opportunities and supplementary-based training need to be reinforced by the schools of public health and local health departments for the future and the existing public health workforce [9]. To handle emergencies and crisis situations, PH graduates require fundamental skills and knowledge associated with communication, analytics, management, and leadership to effectively promote health and prevent diseases in the community. We aimed to elucidate the additional key public health competencies which would be required by the public health graduates post COVID-19 pandemic.

METHODS

We identified three separate groups of participants as our stakeholders. The first and second groups consisted of all students pursuing first- and second-year MPH programs at a training institute, respectively. The third group was heterogeneous and consisted of all faculty involved in teaching PH programs, PH professionals from governmental and non-governmental primary care organizations, and Corporate Social Responsibility Foundations.

Focus group discussions were held with all the three groups of stakeholders. During the COVID-19 pandemic, as India was in lockdown with schools and colleges closed, it was impossible to hold traditional focused-group discussions. Therefore, online FGDs were conducted. This approach was used to gain an in-depth understanding of

the additional competencies required by public health graduates post COVID-19. An explanation of the technique was given to the participants who had been exposed for the first time to the approach. We used a synchronous method to conduct online focus-group discussions. In the synchronous mode, participants exchange their views by concurrently listening to the responses of fellow participants in an online mode at a preset time [10]. The synchronicity of online focused group discussions provided many benefits. The online focus group made them feel comfortable, and participants framed their views more comprehensively.

English was the language used for the discussion. Separate focus group discussions were organized for MPH students from the 1st year batch (2019–2021), 2nd year batch (2020–2022) and faculty from the public health department of an institute imparting public health training (including public health professionals working in the governmental sector, non-governmental organizations) on December 4th and 5th of December 2020 respectively. The first, second, and third groups had 12 participants, 20 participants and eight participants, respectively.

SAMPLING STRATEGY

All students pursuing MPH and all faculty members involved in teaching the MPH program at an academic teaching institute were included. The sampling method used was purposive for participants from governmental, non-governmental, and Corporate social responsibility foundations.

PROCEDURE

The discussion was led by a moderator who took the key points in the discussion. The moderator created a relaxed and comfortable environment for participants. The context of the study was placed across by the moderator. The moderator described the purpose of the focus group discussion, which was to seek input from the participants on the key public health competencies that COVID-19 has taught us and what additional competencies are required for a graduate pursuing the MPH program. The moderator briefly described the core competencies in epidemiology,

biostatistics, environment and occupational health, health system and policy analysis, and social and behavioral sciences that already exist and are enlisted by the Ministry of Health and Family Welfare, Government of India for the Master of Public Health, and the Association of Schools of Public Health (ASPH), USA.

The specific research question that was posed across the group was: What are the key additional primary care public health competencies that COVID-19 has taught us?

ETHICAL ISSUES

A participant Information sheet describing the study objectives and requesting participation was distributed to the participants through email. Informed consent was obtained from all participants in the study. Exemption from ethical review was obtained from Independent ethics committee, Symbiosis International University, Pune, India, since this was a study comparing instructional techniques, curricula, or classroom management, which falls in the 'Exemption from review' category according to the National Ethical Guidelines for Biomedical and Health Research Involving Human Participants (Indian Council of Medical Research, 2017—table 4.2 under point 1).

Consent to Participate

Written informed consent was obtained from the participants in the study.

The online focus group discussion was conducted through Google Meet that ran on the MS Windows platform. An email containing the time of discussion, list of participants, and login ID was sent across. Login was accessible at the set time. All participants were able to view each other and view the chat box where opinions were contributed at the same time. An FGD guide (supplementary material) was prepared by the moderator, who led and regularly asked questions to clarify participants' views, probed, and motivated the participants in the discussion. The moderator probed questions on themes such as advocacy and lobbying, communication, information technology skills required, 'knowledge generation to knowledge translation,' media engagement and disinformation (infodemic/fake news), and systems thinking. Each discussion lasted for 56-61 minutes and each session

was recorded. All participant information was anonymized during the data analysis. All recordings were transcribed and codes were constructed and analyzed thematically using NVivo version 12 software.

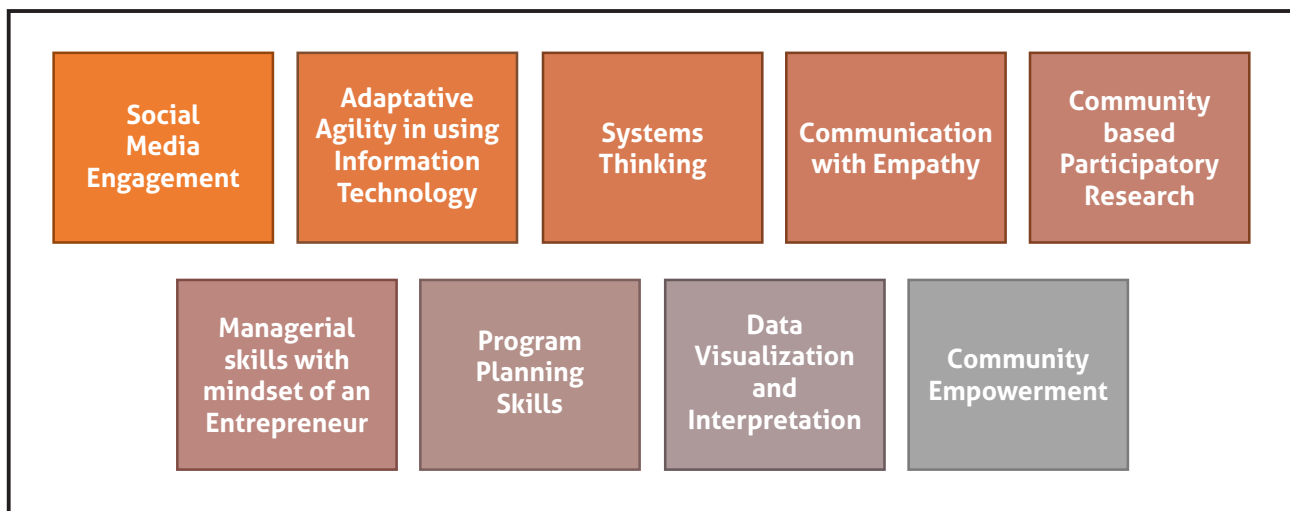
Patient and Public Involvement Statement

The research question was framed by involving the students pursuing MPH during a class discussion on public health competencies. One of the author included in the study was a student pursuing MPH when the FGD was conducted. Students pursuing MPH contacted the alumni, public health professionals working in governmental sector, non-governmental organizations and corporate social responsibility foundations in India and requested them to participate in the FGD. The results of the study were discussed in the classroom and a seminar was held to disseminate the key findings to all study participants at the end of the study.

RESULTS

The age groups ranged from 23 to 60 years (both males and females). Students pursuing MPH had health sciences as the background of education, with varying degrees of qualification.

Sixteen responses were recorded from participants in the first group of 1st year MPH, 17 from 2nd year batch and 12 responses were recorded from the faculty group. Variations in responses were noted for all three groups of participants. Participants provided new insights and pointed out the lacunae in the existing curriculum. There was diversity in the responses among participants. The additional competencies elucidated in the study are summarized in Figure 1. A detailed description of each of the additional competency is given below. These responses were categorized into broad themes and quoting the most striking responses from the participants (Table 1 list the quotations and themes that were elucidated in the study):

**FIGURE 1 - ADDITIONAL PRIMARY CARE PUBLIC HEALTH COMPETENCIES
REQUIRED BY PUBLIC HEALTH GRADUATES POST COVID-19****TABLE 1: THEMES AND QUOTATIONS FROM THE PARTICIPANTS**

Themes	Comments from the participants
Social media engagement	"I mean I also feel that we need to understand media in detail since in this pandemic we learnt that many people have been influenced by media so many information were given through news so I think we should have knowledge of news and how media works in general"
Adaptive agility in using information technology	"It deals with interpretation of statistics and investigates data anomalies and analyses and interpret complex data". "Computer knowledge and skill sets must be embedded within public health specialists but ultimately we have to take help of electronic gadgets or analytics for analysis of the data".
Systems thinking	"At Least 40% of the course should be structured around with work with real world data sets and real-world evidence. Every subject should have a practical aspect to it. For subjects like health policies, Maternal and Child Health, epidemiology we should have separate hours for practical in which they tell us the real-world scenario and give it to us to practice in such a way that when we step out of our colleges, we are very much comfortable at least with the basic concepts of understanding how things work in real world scenario. Learning group discussions and theories wouldn't suffice but we will get in depth knowledge when our practical hours are increased more than our theoretical hours, we would learn more and be more competent in the outside world".
Communication with empathy	"Health literacy is an important aspect as it doesn't matter how much competent and knowledgeable the public health professional is, if the people on the ground level (the public) cannot understand that, then we as public health professionals have failed" "We should be able to communicate the risk to the lay public at least especially risk communication". "Active listening and having opened ended discussion centered around trying to understand the community's perspective is required."
Digital literacy, data management, and IT skills	"We should be given data to play around it to know and interpret and understand that". "Especially during this pandemic, we understood that since we cannot go out social media for IT in general it has very much influence on how we are thinking or how we are propagating our awareness". A novel idea of a newer competency, Public Health Intelligence analysis (PHIA), was brought out in the FGDs. In the participant's own words, PHIA meant- "It deals with interpretation of statistics and investigates data anomalies and analyses and interpret complex data".

Themes	Comments from the participants
Data visualization and interpretation	We need to understand tableau and Future forecasting data analysis". "We have to build soft skill competency, if we want to convince the community we have to have soft skills and so on how to communicate and how to convince and how to deliver our messages that community can understand and apply whatever we are trying to apply".
Managerial skills with the mindset of an entrepreneur	"Pandemic preparedness like that of influenza can be learnt generally for any given condition, so that it becomes easier to act during times of medical emergencies. Also, communication guidelines like the crisis and emergency risk communication (CERC) by CDC can be taken into consideration to make health Communication more efficient"
Financial planning	"For those who go in policy researchers or policy planning or social sectors will get most benefit from financial planning." "Financial management and management preparedness are the core idea COVID-19 has given us. We must have some financial backup if anytime any problem occurs, we can immediately take up those funds. For example, we were not producing enough ventilators or masks or enough PPE so there were financial issues regarding that. So instead of that the government must be prepared for getting a need for future finance to counter attack the pandemic"
Program planning	"If there is something to be implemented or any program which has to be planned so those skills we have to develop through that way". "There are many policies or programs which are still to be implemented or they are still getting implemented so there are many programs where people are actually not aware of like what should be done or where it should have gone through"

Social Media Engagement

We live in a digital world in which fake information travels faster than fact. A strong and trustworthy digital presence allows primary care public health professionals to combat misinformation and spread facts based on real-time evidence. Twitter, WhatsApp, Facebook, blogs, and podcasts are powerful social media platforms where information spreads faster than in traditional press or TV campaigns, as they rely on the snowballing technique. This engagement from the public health professionals was more evident at the time of the pandemic, and the positive influence on the community was more acutely felt when the local governments adapted dynamically to these social platforms. Engagement of media, such as traditional media or social media platforms, is a critical attribute. All PH graduates should be media savvy, and more importantly, they should have a dominant social media presence trying to portray the factual information and not the fake information

Adaptative Agility in Utilizing Information Technology

Information technology (IT) is both a boon and bane. Utilized effectively, IT transforms the health system into a cohesive, structured, transformative, and agile system that responds to local problems that crop up on an emergency basis during epidemics and disasters. The same IT-enabled public health (PH) delivery system can also be disruptive if multiple command chains are built within a hierarchical model, wherein multiple units vie for the same output (an effective healthcare model). Hence, an agile public health professional needs to develop working knowledge on how to effectively implement and evaluate adaptable IT systems that will help deploy real-time solutions to the challenges faced by the community.

Systems Thinking

Networking is a new buzzword that effective managers rely on to deliver time-bound and quality-oriented products to a system. Systems thinking in public health goes a step further by bringing in (a) a holistic perspective into how inputs (resources such as material, manpower, and finances), outputs (immediate targets), and outcomes (long-term effects that we wish to see) interact

dynamically with each other in a dependent and time-bound manner; and (b) an environmental perspective, wherein we understand how the local milieu (both social and political) plays a definite role in providing effective PH delivery models. This deep understanding of 'systems thinking' coupled with strong forecasting and analytic techniques will add a sorely missing competency to PH professionals.

Community Empowerment

An effective engagement with the community needs a two-pronged strategy; that is, it not only provides information but also enables them to play an influential role in making decisions that will ultimately benefit them. Unfortunately, the current power dynamics in the PH system deprive them of decision making. The importance of community engagement was starkly laid out in hot spots such as the Dharavi slum in Mumbai, wherein the PH system was effective in quelling the rising numbers of COVID-19 within a short span of time.

Communication with Empathy

Pandemics and disasters put an enormous strain on the lives of community dwellers, especially in urban slums and congested hot spots where dense populations reside in overcrowded surroundings. To quell the panic and rising anxiety in volatile situations where information is scarce, an efficient and open communication channel is a prerequisite that is often taken for granted. An essential and important competency for a public health professional is the ability to relay effective two-way communication that not only informs but also listens to the feedback arising from the community. The relay of information, that is, from the public health system to the community and from the community to the public health system with the public health professional as the intermediary, is the key attribute that completes the circle in emergency situations.

Data Visualization and Interpretation

Critical thinking and data analytical skills are the traditional core competencies of PH professionals. COVID-19 has shown us that we need to move beyond our own scientific silos and percolate complex data patterns and the ensuing

interpretation to frontline staff and the lay public. The Indian Council of Medical Research and state governments have taken steps in the right direction by establishing dashboards that depict real-time data in the ongoing COVID-19 pandemic information dissemination. In addition, PH professionals need to develop skills to deeply dive and communicate the findings of mathematical models, forecasting tools, and complex data patterns into simple visual and interactive tools so that the layperson is able to understand the implications of the presented data. Predictive modelling is an important skill that PH graduates must possess.

Community Based Participation Research

Sociological sciences have perfected the art of embedding their research in trying to gain the requisite know-how into the complex problems faced by communities. PH professionals need to learn this important skill set from contemporary domains and devise mechanisms that integrate a partnership approach to research that equitably involves decision-makers in the health system, community members, non-governmental organizations, and civil society representatives.

Managerial Skills with the Mind Set of an Entrepreneur

Decision-making, financial management, especially in healthcare financing, equitable work distribution, and work delegation are attributes that are highly valued in the corporate and start-up sectors. When these soft management skills are learned by PH professionals, they become independent and self-reliant individuals who add value to the ecosystems in which they perform. With this skill set, Public Health professionals can focus on converting problems and challenges into opportunities.

Program Planning Skills

Learning program implementation skills is equally important. Few participants showed a quest to learn program implementation and opined that this should be included in the curriculum.

DISCUSSION

In this study, we attempted to identify the additional competencies required by public health graduates post

COVID-19. The majority of participants opined on the importance of digital literacy, data management, and IT skills. The equally important themes that emerged were social media engagement, adaptive agility in utilizing information technology, systems thinking, community empowerment, communication with empathy, data visualization and interpretation, community-based participatory research, entrepreneurship skills, and program planning skills. Many graduates and public health professionals have stressed the importance of engaging with media that shows factual information. Participants in the online FGDs clearly mentioned the importance of skill learning which can be applied in real world settings.

About a third of graduates stated that the MPH program enabled them to develop competencies such as communication and policy development [11]. However, they felt that the analytical assessment competencies, followed by leadership and system thinking competencies, context-sensitive competencies, and planning and management competencies, need to be further improved.

Social media posts alter human behavior and psychology. These outcomes aid the government in enhancing communication by understanding the psychology of the public and managing panic in the community [12]. Large amounts of data are generated through the use of social platforms and websites in various ways, such as healthcare, technology, medicine, news, and socio-political domains, helping interpret knowledge through web mining. This was clearly witnessed in Ireland when Twitter was flooded with tweets when the novel coronavirus emerged. With proper analysis of tweets, better decisions can be made by prioritizing tasks [13].

The computational intelligent online social trackers used for tracking the COVID-19 pandemic were the Honghou Hybrid System (HHS), COVID Tracking Project of Twitter, and FAMEC models. Computational intelligence and online social networking have been utilized to track COVID-19 patients [14]. The curriculum should focus on addressing real-world situations by incorporating key competencies in computational intelligence, infodemics, and data visualization.

Mathematical models help in understanding disease epidemiology, help us in surveillance and alerting, and

generate queries to investigate and gather data. After a mathematical model is ready, the mathematical analysis can be assimilated with the help of computer simulations, which will assist in determining the worldwide behavior of the model. To predict the outcome of the Human Papillomavirus (HPV) vaccination program, these models were utilized to determine differences in biological processes, namely immunity partnership duration, virus strains, and vaccine immunity [15].

The study findings emphasize Infectious disease preparedness using tools such as GIS (Geographic Information System) technology. During COVID-19, integrated command and control centers were converted to COVID-19 warrooms in major urban cities of India by Urban Local Bodies (ULBs). The use of GIS technology helped in identifying containment zones, keeping track of healthcare workers using Global Positioning System (GPS) devices, and keeping track of ambulance and disinfection services in real time. Collaboration with ULBs had been done in cities that are a constituent of the Indian Smart Cities Programme; for example, Pune Smart City Development Corporation Limited operated with Pune Municipal Corporation (PMC) and initiated a dashboard for the purpose of surveillance, monitoring, and tracking. A similar deployment of dashboards on the ULBs website was performed in Surat Municipal Corporation [16].

To tackle global efforts to strengthen resilient health systems, capacity building and training in these additional competencies is the necessity of the hour. Many stakeholders in FGDs have realized the role of global health in public health. Effective, agile, and adaptive leadership is needed in public health systems so that the workforce is competent in handling shocks and emergencies. Instead of a top to bottom approach, a transformational and collaborative approaches is the need of the hour to tackle PHEIC [17].

LIMITATIONS

Although we attempted to list the additional PH competencies that COVID-19 has taught us, our study is not representative of the entire country of India. We attempted to include all relevant stakeholders, including PH graduates, faculty teaching PH programs in India, PH professionals from the government, non-governmental organizations, and the social sector. Our major limitation is

that policymakers and decision-making bodies (both state and federal) were not involved in the FGD. The exigencies and time pressure on policymakers to tackle the ongoing epidemic in 2020 precluded us from including them in our study. Our study could not conduct face-to-face FGDs because of the ongoing pandemic in December 2020 when these FGDs were conducted. Facial expressions and gestures were difficult to note during online FGD.

CONCLUSION

In this article, we have listed the key additional competencies that will make PH professionals add value to the complex primary healthcare ecosystems in which they will perform. To succeed agility, adaptability and ability will have to be the new mantra for addressing the challenges posed by epidemics and disasters. Social media engagement, adaptive agility in utilizing information technology, systems thinking, community empowerment, communication skills with empathy, data visualization and interpretation, community-based participatory research skills, managerial skills with the mindset of an entrepreneur, and program planning skills are additional PH competencies that COVID-19 has taught us. Additionally, incorporating tools such as interpreting mathematical modelling into the curriculum for PH graduates will enable them to predict and respond faster when pandemics such as COVID-19 or PH emergencies occur. These additional competencies will also help public health professionals build Resilient Public Health Systems to tackle Public Health Emergencies such as COVID-19 when they arise.

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