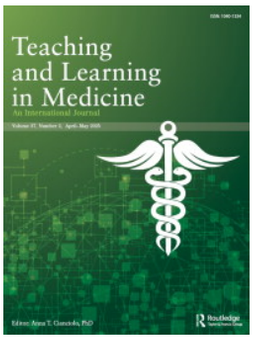

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GROUNDWORK

Identifying Physician Public Health Competencies to Address Healthcare Needs in Underserved, Border, and Outer Island Areas of Indonesia: A Rapid Assessment

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ABSTRACT

Phenomenon: Most medical schools in Indonesia have developed innovations to integrate public health content into the curricula. However, ensuring that all schools meet appropriate standards regarding the quality of subjects, content relevancy, and course delivery takes time and effort. ***Approach:*** This study employed a rapid assessment procedure to identify the current knowledge and competencies required to practice medicine effectively in underserved, border, and outer island areas of Indonesia. Ninety-three participants from six remote districts were involved in 12 focus group discussions. Qualitative data were analyzed using content analysis using the social determinants of health as a guiding framework. ***Findings:*** Under decentralized health system governance, the local socio-geographical context is critical to understanding the current public health landscape. Medical education with respect to public health must emphasize physicians' ability to advocate and encourage the coordination of healthcare services in responding to disasters, as well as community-based surveillance and other relevant data for synergistic disease control. As part of a healthcare facility management team, prospective doctors should be able to apply systems thinking and provide critical input to improve service delivery at local health facilities. Also, recognizing underlying factors is essential to realizing effective interprofessional collaboration practices and aligning them with leadership skills. ***Insights:*** This study outlines recommendations for medical schools and relevant colleges in formulating compulsory block or integrated public health curricula. It also provides a public health learning topic that may aid medical schools in training their students to be competent for practice in underserved, border, and outer island areas. Medical schools should offer initiatives for students to acquire the necessary public health competencies merited by the population's health needs.

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SUSTAINABLE DEVELOPMENT GOAL
SDG 3: Good health and well-being

Introduction

Modern healthcare delivery models emphasize doctors' expanding role within the healthcare system and in meeting community need.[1,2] One of the most significant characteristics of these models is a growing emphasis on addressing nonmedical determinants of health. That is, understanding the impact of social, geographic, and demographic factors on health outcomes and how to work with communities to address these issues.[2,3] Failing to keep up with the healthcare system's challenges, such as health disparity, high costs associated with healthcare, inequitable access, and a shortage of skilled healthcare workers, leads to insufficient health service delivery.[4–6]

The Indonesian healthcare system strives to alleviate health disparities among areas, which may be attributed to various factors. First, geographical variation and doctor shortages, particularly in underserved areas, borders, and outer islands known as *Daerah Tertinggal, Perbatasan dan Kepulauan* (DTPK) cause unequal healthcare service utilization.[7] Despite 12,000 medical graduates yearly, 513 public health centers (*Puskesmas*) out of 10,374 remain without

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doctors, predominantly in DTPK areas. The doctor-to-patient ratio in DTPK areas is 1:67,916, substantially lower than the national ratio of 1:1,510. This shortfall may be attributed to the fact that Indonesia is an archipelago country with more than 17,000 islands and more than 280 million people who experience diverse geographical and demographic handicaps related to access, transportation, socio-economic, cultural, and leadership challenges.[8,9] Second, there is a long-standing maldistribution of doctors and healthcare facilities favoring urban areas and the Java and Bali regions, resulting in insufficient care in rural communities in DTPK areas.[10]

To overcome these conditions, Indonesian medical schools have emphasized the vital linkage between medical education and the public health landscape, i.e., the socio-demographic and geographic variation that influences healthcare systems and outcomes.[11,12] Most are integrating community-based education and health systems topics into their curricula, including social determinants of health, healthcare policy and financing, interprofessional education, patient-centered care, quality improvement, and systems thinking.[13–17]

Further, medical schools have adapted to changing societal circumstances and disease burdens through community-based education in which students learn to apply a holistic and systematic view of health problems.[18,19] Their focus is not only on individuals but also on understanding multidisciplinary care models and cross-sector interventions that address health inequity by respecting local wisdom.[13,20] This progress demonstrates a concerted effort to ensure medical education's quantity, quality, and relevance through early interaction with healthcare delivery organizations and public health issues. Medical education now integrates all aspects of healthcare, considers the supply and demand of medical services, and emphasizes professionalism.[15,21] Evidence supporting this approach may be seen in observations that doctors trained in rural medicine and public health skills, especially those with limited facilities and resources, are likelier to work in remote areas.[11,22]

However, sustainably balancing Indonesia's limited resources with unmet medical needs in DTPK areas remains an urgent challenge. Diversity in populations' demographic characteristics, geography, health systems, disease patterns, and social determinants of healthcare access remains challenging for Indonesia in achieving health equity.[23–25] Although one-third of the undergraduate medical curriculum content in Indonesia is devoted to public health topics, medical schools are dispersed across Indonesia.[13] Ensuring that all schools meet appropriate standards regarding the quality of subjects and course delivery is challenging. It is critical to identify the materials taught, the relevance and applicability of the specific public health content, and the assessment of graduates' public health competency.[20]

Recent research by Noya et al.[19] outlined nine attributes and 29 critical competencies for new doctors to practice in rural and remote areas in Indonesia, but this framework is somewhat generic. Specific considerations of the DTPK context are needed, rather than dichotomizing the country into rural and remote areas, which could prevent the uptake of new required public health competencies into medical education curricula.[26] In other words, there is a need to be more context-specific about engaging stakeholders and local government to remap the most important public health competencies and skills needed to practice in DTPK areas. For these reasons, the present study aims to identify the knowledge and skills that doctors require to practice successfully in remote areas of Indonesia, particularly in the DTPK areas.

Methods

The context of health service in Indonesia

Indonesia is an archipelagic country with the fourth-largest population in the world. There are broad variations between districts in health service utilization. Over 150 million people live on Java island, and another 120 million live in around 7000 other inhabited islands.[27] In 2009, Indonesia initiated a decentralized government, including health service management, with authority and regulations at the provincial or district levels. Governance of health services at the regional level consists of provincial, district, or city levels. The provincial government has a provincial hospital and provides health services through the provincial health office (PHO). The PHO is responsible for strategic planning and coordinating healthcare services at the provincial and cross-district levels. The district/city government has district/city hospitals and provides healthcare services through the district health office (DHO). The DHO also organizes healthcare services offered through *Puskesmas* and their networks. However, the relationship between the Ministry of Health, the province, and the district health offices is not hierarchical.[28]

Indonesia operates three tiered levels consisting of primary, secondary, and tertiary healthcare services. Primary healthcare serves as the first contact to the healthcare system by providing basic health services

(e.g., maternal and child health, family planning, communicable and non-communicable disease control and prevention, and health promotion) to the population. Those roles are responsible for *Puskesmas* and primary-level healthcare facility (e.g., private clinics), which covers 84% of the total healthcare facilities in Indonesia.[29] It has also facilitated many community-based programs, including Integrated Health Service or *Pos Pelayanan Terpadu*. Secondary and tertiary care is delivered in hospitals at the district levels (e.g., for C-D type hospitals), at the provincial level (e.g., B-type hospitals), and at the national level (e.g., A-type hospitals).[30]

With the focus of national health development shifting from curative-oriented to preventive, *Puskesmas* have a significant function of delivering essential healthcare that is socially acceptable and universally accessible to individuals, families, and communities.[31,32] Under the national health insurance, *Puskemas* must provide comprehensive health services covering 144 diseases and preventive, promotive, and rehabilitative services.[33] To ensure continual access, *Puskesmas* are supported by various auxiliary centers such as *Puskesmas Pembantu*, *Polindes* (village maternity post), and *Poskesdes* (Village Health Post).[28] Therefore, investment in primary healthcare has driven the government to increase human resources by providing medical personnel with essential care that can meet most of a person's health needs throughout life.

In addition, a recent report showed that doctors are the third largest health workforce in Indonesia, numbering 186,336 people, where 65% of them are general practitioners working on primary health (*Puskesmas* and Private Clinic).[32,34] Doctors act as care coordinators to provide essential health services and develop an effective and efficient system. In a comprehensive public health ecosystem, doctors play an indispensable role at the local and community level in disease prevention and promotion, as well as being influential at the national or administrative level through direct involvement in formulating healthcare system policies. However, increasing the reach and distribution of quality community health services needs to overcome obstacles due to Indonesia's geographical conditions and socioeconomic factors.[13,34] Java and Bali islands are the country's most developed and populated regions, with 85.2% of *Puskesmas* having a sufficient and even excessive number of doctors. By contrast, in the Nusa Tenggara, Maluku, and Papua islands, 52.41% of *Puskesmas* did not have doctors.[32] In western regions such as Java and Bali islands, around 94% of villages have easy access to hospitals, compared to only 27% in the eastern regions (i.e., Maluku, Nusa Tenggara, and Papua islands). Provinces east of Indonesia (i.e., Maluku, North Maluku, West Papua, and Papua) have lower healthy family indicators, whereas provinces with high levels of healthy family indicators are found in the western region (e.g., Sumatera Islands, Jakarta, Yogyakarta, Bali). Travel time to the hospital and transportation costs affect hospital utilization among outpatients in the eastern region (e.g., Maluku, Papua). Due to the limited number of doctors, some districts still need more access to essential public health services.[27,34]

This study was conducted in six districts representing the DTPK regions. We defined underdeveloped areas as districts less developed than other regions in the country, with a public health development index of less than one (<1).[35] The border area refers to the part of the country's territory located along the Indonesian border with other countries. The small island areas are the outermost islands with populations lacking adequate healthcare access. The outer-outermost islands were concerned due to the uneven distribution of the population.

Study design and theoretical framework

This study used Rapid Assessment Procedures (RAP). This method applies to the relatively narrow focus on a particular health issue, a small number of informants, a short period, and various data collection methods. RAP has a significant strength in its ability to quickly reveal emic perspectives (what stakeholders know about the public health landscape for healthcare workers and how they understand it).[36] Given the ongoing COVID-19 pandemic, we opted for the RAP method, which allowed us to gather rich information quickly.

We adopted the Solar and Irwin[37] framework, which included socioeconomic and political context, structural determinants of health inequities, and intermediary determinants of health. The framework made an essential distinction between each core component in framing health inequities. We used this distinction to identify where the public health landscape could address causes of health inequities that are linked to doctor shortages in underserved areas, borderlands, and outer islands. We followed the standards for qualitative research and COREQ reporting standards to ensure an ethical and reliable reporting process.[38] Our study received ethical clearance from the Medical and Health Research Ethics Committee, Faculty of Medicine, Public Health and Nursing, Universitas Gadjah Mada - Dr. Sardjito General Hospital,

Indonesia (KE/FK/0989/EC/2020). Before conducting group discussion activities, we obtained verbal consent from all participating stakeholders.

Reflexivity

The principal investigator (PHS) is a Floresnese, East Nusa Tenggara Province male with formal public health training. He was interested in studying the interaction between the maldistribution of healthcare workers and health disparity. Before this study, he had performed several qualitative studies and developed policy recommendations regarding the national health systems, especially in the eastern region of Indonesia. The second author (JP), who guided study design, data collection, and analysis, is an Australian public health expert with experience using framework analysis methods for evaluating health inequity issues in middle-income countries. The third author (REG) was an American clinical professor of family medicine and anthropologist. She guided the data analysis process and finalization of study reporting. APS and IAS were medical doctors by training. APS had expertise in bioethics and medical humanities. IAS was a gynecologist who had experience in safe motherhood programs in DTPK areas. APS and IAS were originally from Java and had attended qualitative research training. The sixth author (AM) was a national consultant for the health workforce. He was a medical doctor with formal training in health policy and management. All data collection was performed by the first, third, and fourth authors using the Indonesian language.

Sample and recruitment

We used purposive sampling[39] to select districts for data collection by considering DTPK areas representation, with the final selection of Central Sumba (outer island); Serdang Bedagai, South Minahasa, North Minahasa, and Ketapang (underserved areas); and Bengkayang (border area) for data collection. After we received a permission letter from the district government, we set an approved schedule for focus groups and field visits. Focus group participants included local stakeholders with primary responsibility for health workforce policy development (i.e., planning and recruiting human resources in the health sector) at the district levels, healthcare workers who practiced in the local healthcare facilities, and community health workers with a minimum experience of 3 years and could converse in Bahasa. Based on purposive sampling, participants consisted of the Regent; the Regional Development Agency, which plays a role in planning and coordinating the recruitment of healthcare workers; the District Health Office; Hospital Directors; *Puskesmas* staff; rural doctors, health workers (nurses, midwives, public health, surveillance staff), and community health workers. Table 1 presents the criteria for participant recruitment.

Focus group discussants were recruited by considering potential participants' institutional affiliation and geographic distribution. Then, the district health office staff sent invitation letters to representatives of health facilities (e.g., hospitals and *Puskesmas*), community health workers, or village cadres.

Focus group procedure

Focus group discussions separated participants into two groups in each district. The first group consisted of representatives of the local government and the district health office, and the second group contained doctors, healthcare workers who worked at the public health center or *Puskesmas*, Hospital, and the representative of community health workers. This method aimed to elicit specific information about their perspectives on public health skills, competencies that medical students should receive, and insights regarding collaborating with other professionals to promote high-value care and community health effectively.

Table 1. Types of focus group participants considered for selection.

Actor	Description
Policy Maker	The administrative leader or staff who is responsible for the formulation of policies and regulations relating to or affecting the healthcare system in their district.
District Health Officer	The Health Officer is responsible for developing strategic planning, especially related to the management of health human resources in the district.
Secondary Healthcare facility staff	Health Service Facilities are places in the government and the community used to provide health service activities, including promotive, preventive, curative, and rehabilitative services.
Puskesmas staff	Health workers are defined as public employees involved in the delivery of primary healthcare consisting of doctors, nurses, midwives, and community health workers.
Community Health Workers	Health workers in the village are also invited as policymakers and not in community groups because they are part of the cross-sector in the district.

The focus group protocol (Table 2) included questions that addressed participants' perspectives on the competencies, skills, and nonmedical factors (i.e., social determinants of health and health programs) associated with effective healthcare.

Focus groups lasted 60–80 min and were facilitated by a research team member with previous training in qualitative data collection methods. After receiving permission from participants, the facilitator then recorded audio. The first author (PHS) facilitated focus groups in three districts, the fourth author (APS), and the fifth author (IAS) facilitated focus groups in one district, and trained facilitators led the focus groups in two other districts.

Data analysis

Timely analysis was critical to providing input in the rapid assessment procedure. Therefore, we applied content analysis to describing predetermined topics, using the impact of social determinants and healthcare systems on population health disparities as the framework for analysis. The healthcare system refers to an intermediary factor; improving the equitable distribution of medical doctors can address health disparities. Understanding the complex relationship between social determinants and health is essential for doctors to address health equity; thus, it is necessary to enrich the public health curriculum and continuing education by integrating these social determinants. These appeared at different levels, i.e., what participants said about practical public health competence and skills among rural or remote doctors (policymakers vs. doctors, healthcare workers, and community health workers) and what has been taught or trained compared with ideal practices of the public health field recently. We used the Solar and Irwin's[37] framework to guide how we developed the codes and categories.

Table 2. Focus group questions.

Topic	Question
Health Human Resources Policy and Strategic Planning	• What kind of doctor graduates are needed by the community in your location? • What are the important or unique skills a doctor needs to be ready to work in your location? • So far, have the doctors' skills been able to meet the community's needs for medical and preventive services? • What is your suggestion for a medical graduate institution's education that aligns with the community's needs in your location?
Health service delivery, community health services	• What additional skills must be trained for doctors to adapt to local wisdom in inpatient and community care? • What are the non-medical factors that serve as a barrier for the community to reach health services?

Our team meticulously collected data for approximately one week in each district, ensuring a comprehensive understanding of the local context. We prioritized data saturation by group, setting the criteria at five responses per category and subcategory based on group analysis. After the initial five participants had answered the discussion questions, the facilitator probed for more details to ensure no new data or information emerged. The facilitator and notetaker diligently recorded each participant's responses when discussing a theme or subtheme.

We recorded all focus group discussions and had them professionally transcribed. In stage one, we conducted an inductive analysis. PHS coded all transcripts using open coding. To increase analysis accountability, PHS, JP, APS, and IAS independently read the transcripts and supporting quotations. Through discussion, the researchers grouped these inductively identified coded segments into more significant categories according to doctors' requisite knowledge and skills in the DTPK areas. Therefore, in the second analysis stage, we used interpretive analysis to categorize the focus group data according to nonmedical determinants and the applicability of the specific public health content. The authors discussed all transcripts repeatedly with each other.

We compared the coded transcripts from each district to identify areas of overlap and divergence. We conducted thorough comparisons to identify all data from six districts/cities relevant to each category before determining the final category.

Finally, we grouped the sections with similar coding according to predetermined themes. AM reviewed the analysis documents to ensure no data duplication and that all categories and sub-themes were relevant to public health skills and competencies. PHS, JP, APS, and IAS then translated all the code transcripts and all the selective quotes from Indonesian to English. Four authors conducted the translation because translating qualitative data can potentially result in losing or altering original meanings and emphases (e.g., metaphors may not have the same meaning in other languages and district linguistic characteristics). We applied a technical approach, carrying out translation during data analysis and write-up of the research findings.[40,41] To ensure the accuracy and similarity of the meaning of the qualitative data,

we compared and discussed the translations. In the next stage, REG reviewed the final manuscript.

To ensure the trustworthiness of this study, we employed two techniques.[42,43] The first is methodological triangulation through multi-location data collection (six districts), a process made possible by the invaluable contributions of our stakeholders and healthcare workers. The second is member checking, a crucial step where we discuss the results with these key individuals, who are the source of data collection and the informants of this study. We offered the participants an analysis of the information from the focus groups in a broader context to give them a better understanding of how the study team interpreted their responses.[44] In the end, participant feedback was summarized and used to adjust the analysis process.

Results

We conducted 12 focus groups, with about 5–8 participants for each group per district. A total of 93 people (25–50 years of age) with 3–15 years' experience participated in a focus group: four policymakers; 36 district health officers (leaders and staff); three hospital representatives; 42 *Puskesmas* staff (doctor, nurse, midwife, public health, surveillance staff); and eight community representatives. Data collection from the six districts took three months, and of the 93 participants, 45 were female and 48 were male.

Six participants were from the leading sector in health policy, six were from strategic planning, ten were from healthcare management, 12 were health workforce experts, and seven were general practitioners. Seven participants were disease control and prevention coordinators, 37 were rural health workers, and eight staff were involved in community mobilization at the district levels. See Table 3.

Table 3. Focus group participant characteristics.

Characteristic		N
Organization	Executive/Health Regulator	4
	District Health Office	36
	Public and Private Hospital	3
	Puskesmas and *Puskesmas pembantu*	42
	Community	8
Main expertise and role	District Health Policy	6
	District Health Strategic Planning	6
	Health Workforce Management	12
	Health Service Management	10
	General Practice	7
	Diseases Control and Prevention	7
	Rural Health	37
	Community Mobilization	8

Three main topics were developed *via* content analysis: (1) disaster mitigation planning and health security; (2) practicing health programs management; and (3) connecting evidence to decision-makers and effective advocacy.

Disaster mitigation planning and health security

Natural and non-natural disasters, such as disease outbreaks, result in the DTPK population's need to develop resilience and strategies for adequate mitigation and response. Participants reported that disasters such as floods and forest fires often hit certain areas in the region. Floods from excessive rainfall during the rainy season were isolated in several places. Thus, doctors and other healthcare workers at *Puskesmas* could not refer patients in those areas to hospitals. Therefore, participants noted that public health issues related to appropriate response to natural emergencies with inadequate resources are helpful. Participants argued that medical students should be able to advocate for and promote healthcare coordination in mitigation plans and during disasters.

Three Puskesmas in a remote and isolated area fall into the very remote category: Puskesmas Lembah Bawang, Siding Health, and Suti Semarang. During the rainy season, they find it difficult to refer those patients due to the flooding that isolates and blocks the transportation routes from their place… (40-year female, District Health Office)

…smog due to forest fires often occurs yearly… doctors must be prepared for any situation and be involved in disaster mitigation where they work… (48-year male, District Health Office)

Most participants also said that borderland areas are vulnerable to becoming entry points for cross-border disease spreading, which increases the risk of disease outbreaks and pandemics.

Our workplace covers border areas, but disease surveillance capacity must still be supportive. Imported cases have caused local transmission, but reports are rarely available…we are delayed in detecting and treating because we cannot yet interpret disease monitoring data or information. (38-year male, rural doctor)

Furthermore, participants recommended that prospective doctors in DTPK areas be knowledgeable about disease surveillance systems at the border areas, particularly community-based surveillance, and surveillance from another institution (e.g., veterinary agency and immigration). They argued that this information is helpful for immediate reporting and notification procedures to control the disease's spread through synergetic efforts.

Sometimes, the surveillance staff is not available at our place or office. They usually also do multiple jobs. We suggest that future doctors learn and train on how to interpret data from community-based surveillance. They also need to consider another source of surveillance data in border areas. I think this helps with the accuracy of disease monitoring… (42-year female, District Health Office)

Practicing health program management

Participants said medical students should also be exposed to health program management since most health service activities at the *Puskesmas* and community levels were delivered as health programs or projects.

…We hope medical school facilitates medical students ' exposure to regulations regarding Puskesmas and hospitals' primary tasks. Because we found doctors were not familiar with health programs such as how to plan, monitor, and evaluate… (45-year female, Head of Puskesmas)

According to the participants, medical students needed an elective course in health management during their undergraduate education. This course aimed to prove basic knowledge of applying the management cycle in routine healthcare programs and systems, particularly at *Puskesmas* and community levels, and to lead interprofessional collaboration effectively. Therefore, prospective doctors must be able to recognize and consider the fundamental factors required for an effective local health facilities strategy, such as medical logistics planning, program monitoring, and evaluation.

Prospective doctors should be trained to capture messages or related issues in the community regarding the routine health program implementation at the Puskesmas….they also need to sharpen their leadership to preventive and promotional approaches within interprofessional collaboration… (35-year male, rural doctors from the outer island)

Medical students should also be taught about management functions, especially those relevant to program-based health services. They need to be trained in allocating resources and strategic management… (48-year male, Regional Development Agency)

Connecting evidence to decision-makers and effective advocacy

Most participants said doctors had made essential contributions to district health system performance (e.g., clinical governance at the district hospital, *Puskesmas*, and private clinic). However, they said the decentralized health system model and rapidly changing population health needs require doctors with adequate systems thinking skills. They argued that systems thinking was critical in engaging actively in the district's health policy formulation process. Participants suggested that doctors should apply systems thinking and be able to advocate with evidence-based support. As part of the health facility management team, they plan and advocate critical inputs required for service delivery (e.g., medication, supplies, budget program, health information) at the district level.

Doctors are often invited to cross-sectoral mini-workshops and development planning deliberations in our sub-district…but don't give much input…They need to be more exposed to national health systems and learn how to apply systems thinking to solve clinical and health problems…(45-year female, District Health Office)

When the doctor is asked to provide a suggestion, we just focus on the clinical one because we find it difficult to combine it with other factors… (40-year male, Head of Puskesmas)

According to participants, doctors in the island and remote areas had yet to contribute to developing and influencing health policies in the DTPK areas. The participants also said doctors have not been widely involved in health planning because they cannot incorporate mortality, morbidity, and risk factor data into concrete recommendations for policymakers.

We hope doctors will help us interpret disease-related morbidity and mortality data. However, we have difficulties because we are not supported by doctors or other health workers who know more about these data… (39-year male, surveillance staff at District Health Office)

Participants suggested that educational institutions should offer medical students knowledge management techniques for producing information and evidence, which would be the basis for formulating health policies at the district levels.

They should be taught surveillance and how to interpret data such as disease trends in rural or remote areas and use it for disease control locally… (46-year female, Head of Puskesmas)

Discussion

Our findings highlight the particular characteristics of Indonesia and the relevance of related public health topics for medical school. Considering Indonesia's diverse socio-geographic context, public health content

should stress the ability to advocate for and promote healthcare coordination in disaster mitigation plans and responses. Many countries, including Indonesia, currently include disaster and health security subjects in their medical school curricula.[45] However, more knowledge is needed to inform disaster medicine curriculum development.[45] Most doctors received formal medical education, but only some received systematic disaster medicine training. A systematic review of 25 studies describing disaster medicine curricula for medical students showed that only nine reported the curriculum development process in a way that others could replicate, 12 mentioned the methods used without explaining how these methods were implemented to develop the curriculum, and four did not describe the methodology used to create the curriculum.[46] Moreover, medical students are highly heterogeneous due to the need for pragmatic and standardized guidelines.[45,47]

Disaster and health crisis incidents in Indonesia continue to increase yearly, and doctors may be involved in disaster rescue.[48] However, they tend to become involved after an outbreak or disease epidemic has occurred. A significant criticism is that future disaster medicine curricula should clearly define the role of doctors and other health professionals in disaster rescue and enhance their capabilities to meet current requirements.[45,49] Our findings suggest that doctors may need more knowledge of disaster medicine due to its limited inclusion in medical school curricula and continuing medical education. In disaster areas, doctors must be professionals in emergency response, understand disaster management, and provide input in disaster mitigation planning. This finding is in line with recent evidence that emphasizes doctors become more interprofessional during disaster response if they collaborate with other professionals, including the local disaster management task force.[50]

Another critical issue is non-natural disasters such as disease outbreaks or infectious disease epidemics in border areas. Our findings emphasize that medical students should be knowledgeable about community-based and other relevant surveillance data and synthesize them for synergistic healthcare delivery. Its contribution to the notification of infectious diseases is critical to timely and effective reporting in border areas. Therefore, medical students should be proficient in surveillance systems to detect and stop infectious disease transmission in border areas.[51–53]

In addition, public health topics should enrich the knowledge and skills of prospective doctors regarding Indonesia's decentralized health system. As part of the health facility management team, they should apply systems thinking and advocate critical inputs required for service delivery at the district level. The advocacy we refer to is on the personal level (doctor-patient) and with the healthcare system outside their regular role. They should use their professional expertise to promote solutions to health concerns (e.g., evidence-based clinical practice in health policy development).[54,55]

Moreover, a comprehensive understanding of population health needs in the DTPK areas is strongly related to the context in which there is an interaction between community characteristics, geographic location, and the type of health practice required for each particular context.[53] Medical students need training to provide healthcare in areas with limited facilities and equipment. Therefore, it is critical to foster their knowledge and skills so that they can apply health program management to support their work in the DTPK areas.[56] Our findings suggest that clinical leadership needs to be enhanced with program management skills to achieve a resilient and effective healthcare system.

Most medical schools have initiated health program management subjects aligned with the national health system to promote understanding of how various resources are interconnected in carrying out the district's priority health programs.[15] However, curriculum implementation gaps contribute to superficial learning materials and less relevance,[4] which drives recognition of the role of public health in clinical practice. Recent curricular changes to include health policy, care management, and social sciences recognize the interplay between health and society.[57] Effective systems-based healthcare requires understanding a system's features and characteristics and a sense of how to think about the design, analyze it, and approaches to improve it.[13,58]

Medical students should understand all parts of the healthcare system, from the medical care unit to the patient's family to community organizations.[12,22] Systems thinking skills help doctors analyze and understand how health systems function in improving patient and population health, for example, through advocacy for healthcare policy development.[59] Our findings align with a previous study, which found that student engagement in health advocacy across medical schools can inspire long-term commitment to addressing health inequities.[60] Advocacy can also be aimed at policymakers to enhance resource allocation for evidence-based health policy formulation and implementation of health policies up to primary healthcare levels.[57,61]

The present study is not intended to shift the complexity and load of the healthcare system's context onto medical doctors or to prepare doctors to take over the

role of other health professionals. Public health and medical education are complementary, as both seek to improve the health and well-being of individuals and communities. Our findings underscore the necessity of boosting the role of public health teaching in medical school. Prospective doctors most likely face large-scale health system challenges, such as increasing medical costs, inadequate healthcare capacity, health crises, changes in patient demography, and rapidly growing information technology. Eventually, these challenges pose threats that doctors can only solve with an adequate public health perspective.[62,63] Therefore, an updated set of integrated public health learning with flexible teaching material contributes to contemporary expectations for the professionalism of future doctors, especially in working in DTPK areas.

Limitations and strengths

Our study has limitations inherent in the RAP process of quickly collecting data from a few districts. Findings from these participants may not be transferable to some stakeholders in other localities. Our recruitment strategy only garnered involvement from local government officials, healthcare workers, and the community without representatives from medical schools. This provided a demand-side perspective rather than simultaneously covering the supply and demand side to gain a deep perspective of required competence and skills. Another limitation of our study was that participants may have given socially desirable responses. To minimize this possibility, the facilitator highlighted their backgrounds and asked them to share their experiences and opinions. However, the strength of this study is that it applies qualitative methods to gain an emic perspective of population health needs. We chose the study location relevant to Indonesia's underserved border and outer island areas. The focus groups included participants from heterogeneous settings, which provided rich data that can be raised through interactions in the group. The findings offer actionable recommendations for medical schools and relevant colleges regarding the integrated public health learning curricula needed to prepare doctors for proficient practice in underserved, border, and outer island areas.

Conclusion

Considering Indonesia's particular public health landscape, medical schools must recognize the impact of socio-geographic determinants of health, which continue to blur the line between public health and medicine. Public health content should highlight the importance of advocating for and promoting the coordination of healthcare services in response to disasters, as well as community-based surveillance and other relevant data for effective disease control. Future doctors should be able to apply systems thinking and provide critical input to enhance healthcare service delivery at local health facilities. Understanding underlying factors is crucial for fostering effective collaboration among healthcare professionals and aligning these efforts with leadership skills. This rapid assessment study presents contextual evidence to inform public health learning topics and competencies. The findings provide a reference for developing compulsory blocks or integrated public health learning material primarily focusing on DTPK. In this regard, future studies are encouraged to pilot the proposed public health content for medical students and evaluate its impact on literacy regarding the interaction between socio-geographic factors, health systems, and existing health disparity, particularly in DTPK areas.

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