Leadership in Health Services

Seeking consensus on physician leadership development in rural and remote Indonesian primary care settings: a Delphi study

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Abstract

Purpose – This study aims to formulate a consensus on primary care physicians' leadership competencies tailored to Indonesia's rural and remote health systems using the LEADS framework. Effective physician leaders are essential in these settings; however, many physicians lack the necessary leadership qualifications due to insufficient training. From a medical education perspective, this issue is further compounded by the lack of consensus on leadership course content.

Design/methodology/approach – The study used a mixed-method approach with a concurrent triangulation strategy. Concurrently, a two-round Delphi study and qualitative interviews were conducted. The Delphi study involved academics, rural and remote primary care physicians, intern doctors (similar to house officers), clerks and medical students and used descriptive analysis. Semi-structured interviews, guided by an interview guide, were analysed using inductive thematic analysis.

The authors wish to thank the participants who participated in this study. They also acknowledge the use of AI-assisted tools in the writing process. FM, the principal investigator, is not a native English speaker and used an AI-assisted tool, namely DeepL, to assist in the translation and editing process. The tool was used for translating from Indonesian to English, and vice versa. JB and FS then proofread to ensure readability and maintain contextual coherence.

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Findings – From the initial 62 LEADS framework statements, the authors identified 52 physician leadership attributes in round 1 and 41 attributes in round 2. Qualitative interviews revealed three main themes: the significance of physician leadership, the physician leadership curriculum and its potential and impact.

Originality/value – The study established consensus and provided scholarly insights into the leadership development necessary for primary care physicians in rural and remote areas. This is essential for developing Indonesia's medical leadership curriculum, with the ultimate goal of improving health outcomes in these settings.

Keywords Health leadership competencies, Leaders, Doctors, Rural areas

Paper type Research paper

Background

The World Health Organization emphasizes that primary care delivers essential community care and serves as the basic element for a continuous healthcare process (World Health Organization, 1978). The literature also shows that primary care is intended to be the patient's first contact with care (Fraze *et al.*, 2022) and offers a broad range of first-line prevention and primary care services within the community (Murphy *et al.*, 2019). However, rural (and remote) primary care presents unique challenges such as geographical difficulties, limited resources, socio-demographic constraints (Babawarun *et al.*, 2024), under-supply of primary care physicians (Xue *et al.*, 2019) and also cultural barriers (Farmer *et al.*, 2012). Although there has been great progress over the past few decades, there are still unmet healthcare needs for people in all parts of the world. People, particularly those living in rural (and remote) areas, are challenged in accessing healthcare (Gizaw *et al.*, 2022). The described challenges were also experienced by the healthcare system in Indonesia.

Indonesia is an archipelago of 17,744 islands (Agustina *et al.*, 2019) and home to 283 million people in 2024 (Worldometer, 2024), certainly resulting in various challenges. With its status as a developing country, disparities in services occur in all sectors, including healthcare (Laksono *et al.*, 2019). In particular, the gap in accessing healthcare between urban and rural areas remains a crucial issue (Rahman, 2024). The Central Bureau of Statistics and Presidential Regulation of Indonesia defined rural areas using several key determinants, such as population density, economic capacity and geographic accessibility (Putri *et al.*, 2022). Additionally, the definition of rural and remote area by the Ministry of Health was described using scores calculated using criteria such as location (inland/mountains/coastal/small islands/islands), being in an area prone to natural disasters (earthquakes/landslides), access to public transportation (distance to other districts/obstructed by weather), difficulty in fulfilling basic needs and security factors (Ministry of Health of the Republic of Indonesia, 2015). Unlike urban populations, inhabitants of rural and remote areas usually face more barriers to accessing (primary) healthcare services (Lelyana, 2024).

Primary care in Indonesia – so-called Puskesmas (Pusat Kesehatan Masyarakat) – serves as a front-line healthcare service (Agustina *et al.*, 2019). It offers health services that focus on health promotion and disease prevention besides serving both individual and community health needs (Ministry of Health of the Republic of Indonesia, 2019). Puskesmas can be found in every district, and they engage in providing first-line care to people living in urban, rural or remote areas (Ministry of Health of the Republic of Indonesia, 2015). Following a ministerial decree, the health workforce in primary care needs are expected to consist of a team of doctors, dentists, nurses, midwives, public health workers, environmental health officers, medical laboratory technicians, nutritionists and pharmacists (Ministry of Health of the Republic of Indonesia, 2019). However, due to a shortage of health workers, the Ministry of Health modified the additional roles and competencies of health workers in remote areas (Niedar *et al.*, 2022).

Specifically, in rural and remote environments, access to primary care is usually difficult. The obstacles include geographical barriers (Noya *et al.*, 2023; Wenang *et al.*, 2021) and shortage of health professionals (Booth, 2023; Noya *et al.*, 2023; Rahman, 2024), as well as a maldistribution of the health workforce (Niedar *et al.*, 2022; Sebong *et al.*, 2024). A study noted that only less than 10% of physicians practice in rural settings, which comprise 45% of Indonesia's population (Agustina *et al.*, 2019). Additionally, these settings are socioeconomically disadvantaged (Wenang *et al.*, 2021), including difficulties in providing the cost of transportation to reach services (Wulandari *et al.*, 2022), culture differences (Septiono, 2023), include adhering to a robust kinship system that has impacted health decision-making, for instance, the decision to use health services (Wulandari *et al.*, 2022) and the informed consent process (Susilo *et al.*, 2019). Furthermore, rural and remote environments suffer from poverty-related issues (Rahman, 2024), illiteracy (Ramadan Andiwijaya *et al.*, 2022) and language barriers since various tribes use their own local languages (Laksono *et al.*, 2019).

In Indonesia, the role of primary care as the gatekeeper of health services is inevitably linked to the job descriptions of general practitioners, who have the primary responsibility for carrying out the gatekeeper function on a daily basis (Mulyanto *et al.*, 2021). In responding to the challenges in these settings and considering that physicians have a crucial role to play as gatekeepers, it is recommended that (strong) physician leadership is needed to handle such distinct healthcare challenges (Nieuwboer *et al.*, 2019) especially in the context where they have to contribute as clinicians and leaders (Kadir *et al.*, 2021). Simply put, working in these environments demands that physicians have particular skills (Strasser, 2016) beyond their clinical competence, namely (physician) leadership.

Although physician leadership is vital in Indonesia's rural and remote primary care settings, it is known that many physicians are unprepared for the unique environmental factors in rural and remote geographical areas, such as lack of infrastructure and poor facilities (Noya *et al.*, 2023). They also often exhibit deficiencies in the qualities required for effective organizational leadership (Boothman and Hickson, 2021; Merriam *et al.*, 2021; Quinn and Perelli, 2016). This is because physicians are rarely provided with proper training before taking on leadership roles (Edmonstone, 2018).

Emphasizing the importance of physician leadership development, programs for all experience and training levels are growing. Even experts propose early career training on the diverse aspects of leadership (Sonnino, 2016). Currently, many developed countries have started such programmes. For instance, the UK National Health Service created a Healthcare Leadership Model for all healthcare professionals (Clyne *et al.*, 2015). Likewise, in Canada, The Canadian Society of Physician Leadership, the Canadian Medical Association and the Centre for Healthcare Innovation at the University of Manitoba collaborated on research to collect descriptive data regarding physician leadership (Snell *et al.*, 2016). Meanwhile, in Indonesia, very limited published reports on the review of the Indonesian medical curriculum (Kadir *et al.*, 2021) that specifically emphasize the content of leadership training for physicians practising in rural and remote contexts.

In the present study, we applied the LEADS framework – developed in Canada – to define physician leadership. This framework's acronym stands for its five domains:

(1) Lead self;
(2) Engage others;
(3) Achieve results;
(4) Develop coalitions; and
(5) Systems transformation.

The LEADS framework has been widely adopted in New South Wales, other Australian states, Belgium and India (Dickson and Tholl, 2020). LEADS is a set of capabilities (bundles of competencies) that are aligned and easy to embed in medical education. We, therefore, chose LEADS as a competency model instead of other leadership theories. With five domains, and each domain comprising 9–13 attributes, it provides an extensive range of leadership abilities that are important for educational purposes. Additionally, LEADS can help promote equity and diversity (Dickson and Tholl, 2020) which are very important concepts in rural and remote contexts such as in Indonesia. In the pluralistic context of Indonesia, where varied cultural and other social aspects may influence leadership practice (Yulianti *et al.*, 2021). LEADS also provides the adaptability approach, meaning LEADS has been widely adopted as a foundation for leadership development in many countries. It has also demonstrated its versatility in being used across various health organizations and settings (Dickson and Tholl, 2020).

Further exploration, medical schools definitely play a critical role in equipping graduate physicians with the specialized capabilities required for rural (and remote) practice (Rourke, 2010). Indonesian physicians working in these areas must be equipped with the desired capabilities to practice in these areas. Therefore, specific attributes for effective rural and remote practice must be identified (Noya *et al.*, 2023). Unfortunately, several medical schools lack well-structured leadership curricula and a lack of consensus on physician leadership courses (Clyne *et al.*, 2015), including in Indonesia and its rural and remote contexts specifically. Hence, based on the aforementioned points, our research focused on how to develop a consensus on physician leadership development through the lens of the LEADS framework. We also set out, to identify which leadership capabilities (tailored to their needs) are required by primary care physicians in rural and remote health systems in Indonesia. This endeavour sought to provide a structured set of capabilities that could be incorporated into medical school curricula. Thereby, helping to enhance the leadership skills of graduates and aspiring primary care physicians in Indonesia's rural and remote areas.

Methods

Study setting

This study was conducted in six provinces which are located in the main islands of Indonesia namely Sumatera, Java, Nusa Tenggara, Kalimantan, Sulawesi and Papua (one province for each island). For ethical issues, we could not provide the names of provinces and medical schools that participated in our research.

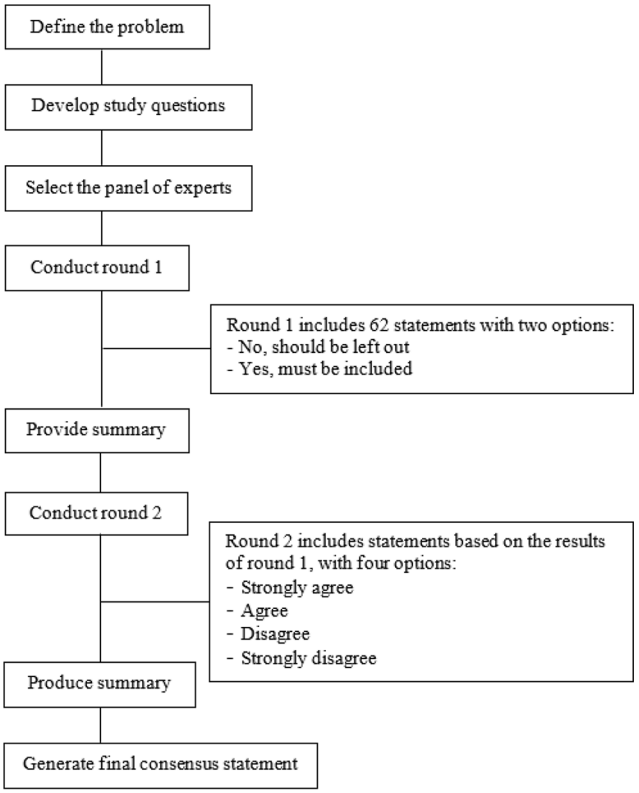
Study design

In this study, we applied a mixed-method approach using a concurrent triangulation strategy. We collected quantitative (a Delphi study) and qualitative (a qualitative interview study) data, analysed and interpreted them independently and allocated equal weight to both approaches to incorporate the two types of information to better comprehend the research problem (Creswell *et al.*, 2004). In actual practice, due to the vast area covered for collecting qualitative data (in six different provinces located on six different islands), we first collected qualitative data and then quantitative data. However, the analysis and interpretation were still subjected to a concurrent triangulation technique.

The Delphi technique was used to reach an agreement among experts. The basic idea was that a varied collection of specialists with different viewpoints might produce more valid

conclusions than a single expert, even if that expert is highly knowledgeable in the field (Belton *et al.*, 2021). Using an iterative procedure, this method addressed complicated challenges with uncertain or insufficient knowledge. As recommended in the literature, we conducted two rounds of the Delphi study (Niederberger and Spranger, 2020) and applied several steps (Hohmann *et al.*, 2018), including a) defining the problem, b) developing study questions, c) selecting a panel of experts possessing relevant knowledge and experiences, d) conducting the first round, e) summarizing the results, f) managing the second round, g) producing a final summary and conclusion; and h) generating a consensus statement, as can be seen in Figure 1.

Meanwhile, a qualitative study was conducted to obtain perspectives of the education side. We investigated the views of the academia on physicians' leadership development for rural and remote medical curricula in Indonesia, including how important physician leadership is when graduate physicians are working in rural and remote environments, to what extent the curricula (at their institutions) have emphasized physician leadership development in this context and the impact of the implementation of the leadership curriculum.



Source: Authors' own work

Figure 1. The Delphi procedure

Participants

Delphi study. In the Delphi technique, we referred to a study that defined experts as informed individuals or specialists in their fields with relevant knowledge and experiences about a subject and a direct stake in the process outcome (Hohmann *et al.*, 2018; Niederberger and Spranger, 2020). Accordingly, we invited groups of experts, including academics, practitioners, intern doctors (similar to house officers), clerkship students and medical students, to represent their respective provinces. All participants were invited by purposive sampling to ensure they were experts in the area where the researcher was interested (Keeney *et al.*, 2001). Most of them were recruited with the assistance of lecturers or other rural and remote health professionals.

- Academics

This panel contained lecturers from six medical schools in the six provinces. They were lecturers with an educational background in public health or family medicine, medical education lecturers and clinical instructors concerned with rural-remote health system issues. They must have been working for at least six months since we considered a study that stated that employees who have worked for six months have become a part of a work team (Frolenoka and Dukule, 2017). It also indicates that they have already adapted and might reflect on their experiences.

- Practitioners

We invited primary care physicians to this panel expert. The criteria, include: the classification of rural or remote primary care refers to the basic data for primary care per province provided by the Ministry of Health (Ministry of Health of the Republic of Indonesia, 2021), and they must have been working in their current workplace for at least six months.

- House officers

In the Indonesian medical education system, house officers are called intern doctors. Intern doctors are physicians who practice medicine (after passing the national examination) under the supervision of senior physicians for a year before becoming independent. They work in a local hospital and mostly in rural primary care (Mustika *et al.*, 2019). They also must have spent at least six months in their training program.

- Clerkship students

Clerkship students are medical students who undergo 1.5–2 years of clinical rotations at the teaching hospital, generally including a family medicine clerkship, under preceptor supervision. Those included in this study must have worked for at least six months in their clerkship program.

- Medical students

We invited medical student who must be at a minimum in their third year of the undergraduate program.

Qualitative study. We also used purposive sampling for the qualitative study to recruit lecturers who have educational backgrounds: public health or family medicine lecturers and medical education lecturers. These lecturers were selected from six public medical schools in the six provinces across the six islands, ensuring diverse academic perspectives reflecting varied experiences in different locations. Participants must have been working for a minimum of one year experience in their respective medical schools, signifying their adaptation and familiarity with the applied medical curricula.

Data collection

Delphi study round 1. In the Delphi study round 1, we collected data through online questionnaires since reaching the various areas in six different provinces of Indonesia was easier. Face validity was used by two rural primary care physicians, one public health lecturer and one medical education lecturer to assess if the questions were feasible and easily understood. To provide a big picture of how rural or remote primary care physicians work in rural or remote areas, we then presented five real-life stories representing the five LEADS framework domains. Rewritten based on previous research findings (Maulina *et al.*, 2023), these stories show the actual experiences of rural or remote primary care physicians in constrained environments. By providing those real stories, we intended to inspire participants to suggest which leadership attributes should be included in Indonesian medical school curricula. Then, we listed LEADS-derived attributes and offered two options including "Yes, must be included" and "No, should be left out". We next asked participants to select the options provided based on their expertise and experiences, indicating that attributes are required while working in rural and remote settings (see Appendix 1).

Delphi study round 2. The same procedure was applied in Delphi round 2. Based on the results of round 1, we then requested participants to rank which leadership attributes they believe are most important and should be included in Indonesian medical school curricula using a 4-point Likert scale including "strongly agree" (point = 4), "agree" (point = 3), "disagree" (point = 2) and "strongly disagree" (point = 1) (see Appendix 2). We received all responses, from rounds 1 and 2, within eight weeks. The Delphi procedure was included, see Figure 1.

Qualitative study. We conducted semi-structured and face-to-face interviews facilitated by FM. We created an interview guide comprising five questions (see Appendix 3) and those interviews were voice-recorded.

Data analysis

Delphi study. The data collected from both Delphi rounds were analysed using descriptive analysis. The attributes considered in round 1 were those that achieved 80% agreement among all participants (Hasson *et al.*, 2000). Later, these attributes were used in round 2. Further, in round 2, the competencies with a mean of 3.40 or higher (representing "agree" to "strongly agree") were included in the final competency list. We then formulated a concluding consensus statement.

Qualitative study. In the meantime, the interviews were transcribed *verbatim*. Then they underwent an inductive thematic analysis process that included the following steps:

- initial coding;
- theme search;
- theme examination;
- theme defining and labelling; and
- writing up the results (Nowell *et al.*, 2017).

First and foremost, the primary researcher, FM, reread the entire interview transcripts to familiarize herself with the whole data. Through inductive analysis, FM provided keywords and then produced the initial codes which captured the core message of the data. The codes that have patterns, and relationships, and are also relevant to the research objective are then interpreted as themes. FM subsequently furnished all codes, themes and quotes. Afterwards, FM and MH (the second author) had a conversation about revisiting the issues, exchanging thoughts, discussing the discrepancies and resolving them. FM subsequently translated into English specific quotations that depict each theme and delivered the conclusive findings to the remaining members of the research team.

Ethical consideration. The research protocol was approved by the Medical and Health Research Ethics Committee of the Faculty of Medicine, Public Health and Nursing at Universitas Gadjah Mada/Dr Sardjito General Hospital, Yogyakarta, Indonesia, Ref. No. KE/FK/0510/EC/2023.

Reflexivity. Jamiu O. Busari is a pediatrician and clinician educator and an associate professor of medical education. He is particularly interested in equity issues and leadership development in postgraduate medicine. Fedde Scheele holds the position of a professor specializing in health systems innovation and education in Amsterdam while also actively working as a gynecologist. In multidisciplinary research initiatives, his area of expertise is qualitative approaches. Mubasysyir Hasanbasri is a medical doctor and an associate professor of public health in Indonesia. He teaches courses on primary healthcare policy and administration. Fury Maulina, a general practitioner based in Aceh, is particularly interested in the study of physician leadership in underserved communities and healthcare systems in rural and remote environments.

The authors were conscious of the possibility of bias in qualitative studies, particularly given that the primary researcher (FM) comes from the environment being studied. Yet, despite this potential risk, the authors thought that the varied makeup of their research team would adequately counteract any such bias. On the design, data processing and interpretation of the study, for example, FS and JB offered a distinctive Western European perspective based on their background as Dutch physician leaders and researchers. In addition, as a senior researcher from Indonesia, MH also monitored the project and, using his knowledge of the local and cultural dynamics, made important suggestions.

Results

Delphi study round 1

In the Delphi survey round 1, a total of 127 invitations were sent out, and we received 113 people who participated, resulting in a response rate of 89%. The demographic characteristics can be seen in Table 1 in column "Round 1". After providing 62 statements of the LEADS framework, we obtained 52 statements with 80% agreement among all participants. Consequently, ten statements were excluded in the Delphi study round 2 (see Table 2). The top three attributes that were most chosen (reached a percentage of 100%) i.e. facilitate environments of collaboration and cooperation to achieve results (engage others domain), questions and challenges the status quo, thereby effecting positive change and fostering innovation (systems transformation domain) and creates a climate of continuous improvement and creativity aimed at systemic change (systems transformation domain). More details, based on each domain, we indicated:

- Lead self-domain obtained 9 of 11 attributes (82%).
- Engage others domain obtained 9 of 13 attributes (69%).
- Achieve results domain obtained 9 of 10 attributes (90%).
- Develop coalitions domain obtained 13 of 15 attributes (87%).
- Systems transformation domain obtained 12 of 13 attributes (92%).

Within round 1, the domains "Systems transformation" and "Achieve results" were voted the most by the panel experts.

Delphi study round 2

After completing round 1, we administered round 2 of the Delphi study questionnaire. We sent out invitations to 113 participants who had previously participated in round 1 and received 107 responses, representing a response rate of 94.7%. The demographic characteristics are in

Table 1. Participant characteristics in Delphi study round 1 (n = 113) and round 2 (n = 107) presented by n (%)

	Round 1					Round 2				
Characteristics	Academics n = 26	Practitioners n = 32	House officers n = 15	Clerkships n = 20	Medical students n = 20	Academics n = 25	Practitioners n = 30	House officers n = 14	Clerkships n = 19	Medical students n = 19
Age (in years)										
20–25	n/a[1]	n/a	4 (26.7)	20 (100)	20 (100)	n/a	n/a	4 (28.6)	19 (100)	19 (100)
25–35	5 (19.2)	21 (65.6)	11 (73.3)	0	0	5 (20)	20 (67)	10 (71.4)	0	0
36–45	11 (42.4)	3 (9.4)	n/a	n/a	n/a	9 (36)	2 (7)	n/a	n/a	n/a
46–55	5 (19.2)	7 (21.9)	n/a	n/a	n/a	6 (24)	7 (23)	n/a	n/a	n/a
>55	5 (19.2)	1 (3.1)	n/a	n/a	n/a	5 (20)	1 (3)	n/a	n/a	n/a
Gender										
Male	13 (50)	5 (15.6)	5 (33.3)	11 (55)	7 (35)	13 (52)	4 (13.3)	4 (28.6)	11 (57.9)	6 (32)
Female	13 (50)	27 (84.3)	10 (66.7)	9 (45)	13 (65)	12 (48)	26 (86.7)	10 (71.4)	8 (42.1)	13 (68)
From a rural or remote background										
No	16 (61.5)	13 (40.6)	9 (60)	12 (60)	15 (75)	15 (60)	12 (40)	9 (64.3)	12 (63.2)	15 (79)
Yes	10 (38.5)	19 (59.4)	6 (40)	8 (40)	5 (25)	10 (40)	18 (60)	5 (35.7)	7 (36.8)	4 (21)
Educational background										
PH/FM[2]	19 (73.1)	n/a	n/a	n/a	n/a	18 (72)	n/a	n/a	n/a	n/a
ME/HPE[3]	6 (23.1)	n/a	n/a	n/a	n/a	6 (24)	n/a	n/a	n/a	n/a
CI[4]	1 (3.8)	n/a	n/a	n/a	n/a	1 (4)	n/a	n/a	n/a	n/a
Type of primary care										
Rural	n/a	29 (90.62)	n/a	n/a	n/a	n/a	27 (90)	n/a	n/a	n/a
Very remote	n/a	3 (9.38)	n/a	n/a	n/a	n/a	3 (10)	n/a	n/a	n/a
Work experience in the current workplace (in years)										
1–5	5 (19.2)	24 (75)	n/a	n/a	n/a	5 (20)	22 (73)	n/a	n/a	n/a
6–10	1 (3.8)	5 (15.6)	n/a	n/a	n/a	1 (4)	5 (16.7)	n/a	n/a	n/a
11–15	9 (34.6)	0	n/a	n/a	n/a	8 (32)	0	n/a	n/a	n/a

(*continued*)

Table 1. Continued

Characteristics	Round 1 Academics *n* = 26	Practitioners *n* = 32	House officers *n* = 15	Clerkships *n* = 20	Medical students *n* = 20	Round 2 Academics *n* = 25	Practitioners *n* = 30	House officers *n* = 14	Clerkships *n* = 19	Medical students *n* = 19
16–20	7 (27)	2 (6.3)	n/a	n/a	n/a	7 (28)	2 (6.7)	n/a	n/a	n/a
>20	4 (15.4)	1 (3.1)	n/a	n/a	n/a	4 (16)	1 (3.3)	n/a	n/a	n/a
In a leadership role in my current workplace										
No	9 (34.6)	4 (12.5)	n/a	n/a	n/a	8 (32)	4 (13.3)	n/a	n/a	n/a
Yes	17 (65.4)	28 (87.5)	n/a	n/a	n/a	17 (68)	26 (86.7)	n/a	n/a	n/a
Received leadership training in an undergraduate program										
No	n/a	n/a	8 (53.3)	7 (35)	3 (15)	n/a	n/a	7 (50)	6 (31.6)	3 (16)
Yes	n/a	n/a	7 (46.7)	13 (65)	17 (85)	n/a	n/a	7 (50)	13 (68.4)	16 (84)

Notes: [1]not applicable; [2]public health/family medicine; [3]medical education/health professions education; [4]clinical instructor who is concerned with rural-remote health system issues
Source: Authors' own work

Table 2. The result from Delphi study round 1 (n = 113)

No.	Attributes* A competent physician leader…	No, should be left out *n* (%)	Yes, must be included *n* (%)
1	Is aware of their own assumptions, beliefs and principles	11 (9.7)	102 (90.3)
2	Is aware of their own strengths and limitations	6 (5.3)	107 (94.7)
3	Takes responsibility for their own performance	2 (1.8)	111 (98.2)
4	Takes responsibility for their own health	10 (8.8)	103 (91.2)
5	Actively seeks opportunities and challenges for personal learning, character building and growth	6 (5.3)	107 (94.7)
6	Models' qualities such as honesty, integrity, resilience and confidence	1 (0.9)	112 (99.1)
7	Is genuine and passionate	8 (7.1)	105 (92.9)
8	Is comfortable in their own shoes	13 (11.5)	100 (88.5)
9	Understands when the right time is to pass on information	8 (7.1)	105 (92.9)
10	Supports and challenges others to achieve professional goals	4 (3.5)	109 (96.5)
11	Creates engaging environments in which others have meaningful opportunities to contribute	4 (3.5)	109 (96.5)
12	Ensures that resources are available to fulfil expected responsibilities	17 (15)	96 (85.0)
13	Listens well and encourages an open exchange of information and ideas using appropriate communication media	3 (2.7)	110 (97.3)
14	Facilitates environments of collaboration and cooperation to achieve results	0	113 (100)
15	Fosters leadership across the community	18 (15.9)	95 (84.1)
16	Wants to hear the information first-hand	12 (10.6)	101 (89.4)
17	Represents active listening	4 (3.5)	109 (96.5)
18	Wants to understand the commitment being made and to be assured it will positively affect their community	9 (8.0)	104 (92.0)
19	Inspires vision by identifying, establishing and communicating clear and meaningful expectations and outcomes	2 (1.8)	111 (98.2)
20	Integrates organizational missions and values with reliable, valid evidence to make decisions	4 (3.5)	109 (96.5)
21	Acts in a manner consistent with organizational values to provide effective and efficient public-centered service	6 (5.3)	107 (94.7)
22	Assesses and evaluates outcomes	3 (2.7)	110 (97.3)
23	Compares the results against established benchmarks	7 (6.2)	106 (93.8)
24	Corrects the course as appropriate	4 (3.5)	109 (96.5)
25	Invites the community to set the direction	9 (8.0)	104 (92.0)
26	Creates a space where everyone has an opportunity to speak and learn from each other regardless of who they are	6 (5.3)	107 (94.7)
27	Understands that cultural safety is more than a history lesson (it is about opening dialogue with many different people about wellness; in this sense, the leader creates the appropriate conditions for this dialogue and joint learning to take place)	5 (4.4)	108 (95.6)
28	Creates connections, trust and shared meanings with individuals and groups	2 (1.8)	111 (98.2)
29	Facilitates collaboration, cooperation and coalitions among diverse groups and perspectives with the aim to improve service	2 (1.8)	111 (98.2)
30	Uses methods to gather intelligence	6 (5.3)	107 (94.7)
31	Encourages an open exchange of information	11 (9.7)	102 (90.3)
32	Uses quality evidence to influence action across the system	8 (7.1)	105 (92.9)

(*continued*)

Table 2. Continued

No.	Attributes* A competent physician leader…	No, should be left out *n* (%)	Yes, must be included *n* (%)
33	Shows a political astuteness (adeptly uses skills, knowledge and judgements to shape an environment that will influence the organization's decision-making process)	13 (11.5)	100 (88.5)
34	Can negotiate through conflict	6 (5.3)	107 (94.7)
35	Invests in getting to know the people in the community so that they learn more about how the community operates	9 (8.0)	104 (92.0)
36	Nurtures relationships over time; rather than visiting the community once, the competent leader is dedicated to long-term relationships	6 (5.3)	107 (94.7)
37	Passes forward information and knowledge	3 (2.7)	110 (97.3)
38	Protects the wisdom of the past and uses it to educate the future	21 (18.6)	92 (81.4)
39	Recognizes that knowledge can come from many different sources	7 (6.2)	106 (93.8)
40	Acknowledges that historic agreements have a key place in indigenous history and are therefore foundational to many conversations	14 (12.4)	99 (87.6)
41	Thinks analytically and conceptually	2 (1.8)	111 (98.2)
42	Questions and challenges the status quo (thereby effecting positive change and fostering innovation)	0	113 (100)
43	Can identify issues, solve problems and design and implement effective processes across systems and stakeholders	2 (1.8)	111 (98.2)
44	Creates a climate of continuous improvement and creativity aimed at systemic change	0	113 (100)
45	Scans the environment for ideas, best practices and emerging trends (and, in doing so, makes maximum use of the resources available)	3 (2.7)	110 (97.3)
46	Actively contributes to change processes that improve health service delivery	2 (1.8)	111 (98.2)
47	Recognizes that communities and nations need to be able to control their systems and make their own decisions	19 (16.8)	94 (83.2)
48	Aims to include all healthcare providers and indigenous people (is able to organize and manage a heterogeneous group, whilst respecting their uniqueness in an empathetic, unbiased way)	9 (8.0)	104 (92.0)
49	Recognizes that each community is unique and that each community, therefore, requires a tailored approach; there is no one-size-fits-all	6 (5.3)	107 (94.7)
50	Realizes that today's decisions impact the leaders of tomorrow as well as their future quality of life	8 (7.1)	105 (92.9)
51	Acknowledge that health transformation pushes limits to promote required changes	4 (3.5)	109 (96.5)
52	Accounts for and modifies timelines, so as not to rush community decision-making	3 (2.7)	110 (97.3)

Notes: *Statements 1–9 represent the lead self-domain; statements 10–18 represent the engage others domain; statements 19–27 reflect the achieve results domain; statements 28–40 concern the develop coalitions domain; and statements 41–52 appertain to the systems transformation domain
Source: Authors' own work

Table 1 in column "Round 2". In round 2, participants were asked to rate their level of agreement with the presented statements. From the 52 statements provided, we then discovered that 41 attributes received a mean of ≥3.40 from all respondents and were thus included in the summary and conclusion of the consensus (see Table 3).

Table 3. Delphi study round 2 (n = 107), displayed by mean, the final consensus

No.	Attributes* A competent physician leader…	All respondents
1	Is aware of their own strengths and limitations	3.49
2	Takes responsibility for their own performance	3.70
3	Takes responsibility for their own health	3.62
4	Actively seeks opportunities and challenges for personal learning, character building and growth	3.52
5	Models qualities such as honesty, integrity, resilience and confidence	3.63
6	Is genuine and passionate	3.44
7	Understands when the right time is to pass on information	3.55
8	Supports and challenges others to achieve professional goals	3.44
9	Creates engaging environments in which others have meaningful opportunities to contribute	3.41
10	Ensures that resources are available to fulfil expected responsibilities	3.41
11	Listens well and encourages an open exchange of information and ideas using appropriate communication media	3.50
12	Facilitates environments of collaboration and cooperation to achieve results	3.49
13	Wants to hear the information first-hand	3.49
14	Represents active listening	3.59
15	Wants to understand the commitment being made and to be assured it will positively affect their community	3.40
16	Inspires vision by identifying, establishing and communicating clear and meaningful expectations and outcomes	3.52
17	Integrates organizational missions and values with reliable, valid evidence to make decisions	3.47
18	Acts in a manner consistent with organizational values to provide effective and efficient public-centered service	3.43
19	Assesses and evaluates outcomes	3.60
20	Compares the results against established benchmarks	3.50
21	Corrects the course as appropriate	3.49
22	Creates connections, trust and shared meanings with individuals and groups	3.46
23	Facilitates collaboration, cooperation and coalitions among diverse groups and perspectives with the aim to improve service	3.47
24	Uses methods to gather intelligence	3.50
25	Encourages an open exchange of information	3.44
26	Uses quality evidence to influence action across the system	3.50
27	Can negotiate through conflict	3.49
28	Nurtures relationships over time; rather than visiting the community once, the competent leader is dedicated to long-term relationships	3.43
29	Passes forward information and knowledge	3.56
30	Recognizes that knowledge can come from many different sources	3.43

(*continued*)

Table 3. Continued

No.	Attributes* A competent physician leader…	All respondents
31	Thinks analytically and conceptually	3.59
32	Questions and challenges the status quo (thereby effecting positive change and fostering innovation)	3.56
33	Can identify issues, solve problems and design and implement effective processes across systems and stakeholders	3.61
34	Creates a climate of continuous improvement and creativity aimed at systemic change	3.47
35	Scans the environment for ideas, best practices and emerging trends (and, in doing so, makes maximum use of the resources available)	3.49
36	Actively contributes to change processes that improve health service delivery	3.51
37	Aims to include all healthcare providers and indigenous people (is able to organize and manage a heterogeneous group, whilst respecting their uniqueness in an empathetic, unbiased way)	3.49
38	Recognizes that each community is unique and that each community, therefore, requires a tailored approach; there is no one-size-fits-all	3.41
39	Realizes that today's decisions impact the leaders of tomorrow as well as their future quality of life	3.43
40	Acknowledge that health transformation pushes limits to promote required changes	3.45
41	Accounts for and modifies timelines, so as not to rush community decision-making	3.50

Notes: *Statements 1–7 represent the lead self-domain; statements 8–15 represent the engage others domain; statements 16–21 reflect the achieve results domain; statements 22–30 concern the develop coalitions domain; and statements 31–41 appertain to the systems transformation domain
Source: Authors' own work

Further, the top three that reached the high mean, i.e. take responsibility for their performance, model qualities such as honesty, integrity, resilience and confidence and take responsibility for their own health, with the mean being 3.70, 3.63 and 3.62, respectively. Those three were part of the lead self domain. Specifically, we identified, based on each domain:

- Lead self-domain obtained 7 of 9 attributes (78%).
- Engage others domain obtained 8 of 9 attributes (89%).
- Achieve results domain obtained 6 of 9 attributes (67%).
- Develop coalitions domain obtained 9 of 13 attributes (69%).
- Systems transformation domain obtained 11 of 12 attributes (92%).

Within round 2, the panel experts voted the most on the domains "Systems transformation" and "Engage others".

Qualitative study

We interviewed 13 respondents (Table 4) with an average age of 45.8 years, the youngest being 32 years and the oldest being 65 years. Seven of the 13 respondents were female, and 46% had a medical education background. Over half (69%) grew up in rural or remote areas. The length of employment at the current workplace was 17.1 years on average, with the shortest time being a year and the longest being 45 years. Most of them (69%) had a leadership role at their current workplace, i.e. chief of the medical education unit (n = 2), head of the undergraduate program (n = 2), head of the public health department (n = 1), head of the family medicine department (n = 1), chief of quality assurance at university level (n = 1), chief of quality assurance at the faculty level (n = 1) and chief of skills laboratory (n = 1).

Based on the interviews performed, we determined three themes. They include: 1) the importance of physician leadership, 2) physician leadership curriculum and 3) the potential and impact of physician leadership (curriculum) development (see Table 5).

Responses to theme 1, which underscores the importance of physician leadership, emerged from respondents due to the need for (physician) leaders to manage health programmes. One respondent stated that physician leadership is necessary to integrate one programme with other health programmes in primary care. For instance, a diabetes patient is more susceptible to tuberculosis, which necessitates the integration of diabetes and tuberculosis care teams by a physician leader. Meanwhile, other respondents also mentioned that physician leaders play crucial roles in managing the organization (primary care) by leading the primary care staff. In addition, respondents perceived that, especially in rural and remote environments, physicians serve as role models for their communities, and local people believe that they are capable of resolving health issues at both the individual and community levels. Not only deal with geographical barriers physician leadership is needed since rural or remote primary care physicians also have to tackle cultural barriers and trust issues among Indigenous communities. Furthermore, a respondent highlighted that physicians are capable of "orchestrating" their teams. Meanwhile, another respondent asserted that to accomplish health outcomes, physicians must engage and collaborate with local communities. Additionally, we found that physicians are required not only simply to treat the patients but also to lead and mobilize the community, ensuring that everyone is working towards the same objectives.

Table 4. Participant characteristics (n = 13)

Characteristic	Total (n)	%
Age (in years)		
25–35	2	15
36–45	4	31
46–55	5	39
>55	2	15
Gender		
Male	7	54
Female	6	46
Educational background		
Public health or family medicine	7	54
Medical education	6	46
From a rural or remote background		
No	4	31
Yes	9	69
Length of employment at my current workplace (in years)		
1–5	1	8
6–10	1	8
11–15	5	38
16–20	3	23
>20	3	23
In a leadership role in my current workplace		
No	4	31
Yes	9	69

Source: Authors' own work

Theme 2 is related to the physician leadership curriculum. Of the respondents, the majority were convinced that leadership capabilities are essential; however, they also recognized that leadership-related curricula were not well-structured. Although medical schools do offer leadership-related curricula, the curriculum is not inherently tailored to rural or remote contexts, and only little attention is paid to leadership development. Other respondents also noted that medical students' leadership development was primarily achieved indirectly, such as through extracurricular activities. In addition, respondents also emphasized that the curricula designer should emphasize and provide sufficient rural and remote contexts in medical curricula to provide medical students with adequate insights into rural and remote circumstances to develop physician leaders that are tailored to these environments.

The potential and impact of physician leadership (curriculum) development were emphasized in theme 3. The majority of respondents believe that the idea of physician leadership development that is specifically designed for rural and remote contexts would be a beneficial starting point, particularly for Indonesia. Additionally, other respondents emphasized that adaptation and modification may be necessary due to the unique challenges faced by each country. Moreover, due to the diverse cultures and values that are implemented in rural and remote communities, a respondent stated that Indonesia would serve as an excellent "reference" for other Asian nations that share (almost) similar cultures, particularly those in Southeast Asia countries.

Table 5. Themes, codes and quotations

Theme	Code, quote and [participant …]
The importance of physician leadership	Managing (health programmes, organizations and communities) *"We know that people with diabetes mellitus (DM) are more likely to get tuberculosis than those without DM. The diabetes and TB care teams, meanwhile, are solely concerned with their tasks. There is also no (physician) to guide them. They have a risk factor that is five times higher than the average person. Surprisingly, screening was not performed on those who had diabetes. In reality, diabetes sufferers visit primary care nearly every week. Synergy is crucial in any endeavor. It's impossible to accomplish on your own. That's why leadership and an integrated approach are required there."* [Participant 1] *"It is necessary for physicians to have the skills to organize a primary care team, comprehend administration, coordinate, and communicate […] "* [Participant 6] *"Physicians are an important part of society. Even in society, physicians are seen as role models in their field of work, and their opinion is often sought. Physicians must be able to handle the community to improve the health of the community as a whole."* [Participant 13] *"…especially in rural areas, since they have to make decisions while simultaneously solving health problems at both the individual and community levels."* [Participant 10] Dealing with problems (with difficulties such as cultural differences, trust issues and geographical barriers) *"Physicians need to be able to adjust to the surrounding community, learn their customs and traditions, and avoid conflict with the locals in favor of cultivating close relationships with them."* [Participant 12] *"Building trust with indigenous populations is difficult. Even if it is manageable, there are dynamics involved."* [Participant 6] *"Because there are many rivers in the vicinity, then, physicians may need up to 12 h of travel time to reach the destination."* [Participant 11] Working with others (primary care staff and rural or communities) *"In remote or rural places, physicians have to be able to 'orchestrate' their team. Identifying community concerns, approaching the community, and offering counselling, for example, do not always have to be done by a physician. Physicians can 'delegate' other primary care staff to finish the tasks. Additionally, physicians must be able to guide primary care staff to reach health goals."* [Participant 8] *"The ability to identify and engage local people from various backgrounds is essential. Maybe we all used to believe that our profession was the greatest, but now we realize that we need to collaborate with local residents for the success of health programs."* [Participant 9] Setting the direction (ensure everyone is working toward the same goals) *"More than only treating patients, physicians are expected to be able to manage the community to achieve the primary care goal."* [Participant 13] *"…also for mobilizing rural and remote communities to attain health goals."* [Participant 8] *"… more remote and rural an area is, the more pivotal the role of the physician to managing people in achieving health outcomes."* [Participant 7]
Physician leadership curriculum	Unwell-structured curricula (little attention to physician leadership development, implicit and indirect ways) *"The lack of emphasis on rural or remote area issues persists. However, I am*

(*continued*)

Table 5. Continued

Theme	Code, quote and [participant …]
	certain that in other sections, such as community medicine, it is likely to be mentioned, even if it is not the main focus, highlighted, or given enough weight. Perhaps only in terms of general leadership in health services […] " [Participant 13] *"… so far, however, leadership skills development has not been formally incorporated*." [Participant 1] *"… acquired indirectly. The weekly rotation through the positions of chairman, scriber, and participant in a tutorial class is one way in which students are exposed to different roles of leadership."* [Participant 11] *"… through extracurricular activities. For example, one of my students was involved in the organization. It helped shape her leadership skills. She is quite good both while speaking in public and in the way that she communicates with others. As a result, leadership skills distinguish one person from another. It is also easier to deal with students who have demonstrated strong leadership qualities."* [Participant 5]
	Need (rural and remote) contexts *"They should comprehend the context, which means that students will learn more quickly if they understand the purposes. Sometimes when we act, we don't know what we're doing or where we're going."* [Participant 1] *"… regarding rural and remote communities, we teach about resilience. Students are also taught how they, as physicians, may optimize what they have in the capital to improve health status. So, they can identify the potential that an area has. When we prepare students to deal with the challenges of living in rural or remote places, we ensure that they will be able to make it by overcoming those challenges and continuing to offer health services to the community. This includes the ability to survive despite the limitations they face while also being creative."* [Participant 8]
The potential and impact of physician leadership (curriculum) development	Starting point *"We have a similar culture in the context of Asia, particularly Southeast Asia, so it can be validated in other nations. This consensus can subsequently be modified and refined. Our society is unquestionably distinct from that of other nations, so it must be adapted to the conditions of each nation. The conceptual framework may be the same, but the implementation will differ."* [Participant 8] *"It can be used as a reference, particularly for countries with similarities to Indonesia*." [Participant 13]
	The specific set of cultures, practices and values *"Because of the similarities in values and culture, characteristics of the community, geography, and health systems, the consensus can serve as a frame of reference for other countries to look at and then modify to fit their own needs. Because of the commonalities, adaptation will be easier."* [Participant 5] *"Because Indonesia has so many diverse cultures, for example, due to its huge geography, reaching a consensus will be tough, and adapting and becoming a reference point for other countries will be even more challenging. Nonetheless, this is good capital because of Indonesia's rich culture."* [Participant 7]

Source: Authors' own work

Discussion

The primary objective of this study was to provide a consensus on physician leadership capabilities tailored to primary care physicians practising within Indonesia's rural and remote health systems. Through two rounds of the Delphi study, we reached a consensus that consisted of 41 out of the 62 leadership attributes provided. Additionally, three main themes emerged over the qualitative study:

(1) The importance of physician leadership in rural or remote primary care;
(2) Physician leadership curriculum; and
(3) The potential and impact of physician leadership (curriculum) development.

We indicated that formulating the set of competencies and those three points emphasized obtained from qualitative research will be useful to medical schools in designing medical curricula to adequately train future physician leaders, particularly those practising in rural or remote places in Indonesia.

Of 41 leadership attributes chosen by panel experts, our findings showed that those qualities majority came from the domains of systems transformation, followed by engage others domain. Firstly, we highlighted that out of the two rounds of the Delphi study, the systems transformation domain consistently received the most votes among the participants. This indicates that the panel experts felt that being a primary care physician in a rural or remote area requires the ability to transform the system. In rural and remote settings, the challenges are not only due to limited resources and a lack of qualified health personnel but also cultural barriers (Ahmed *et al.*, 2022). Research on population health and epidemiology indicates that culture significantly impacts health outcomes. In such cases, culture can either be a barrier to health or a protective element; it can impede health interventions and promote and prolong behaviours that harm well-being (Hruschka, 2009). However, from the health system lens, culture tends to be acknowledged as a challenge to facilitating equitable access to health. Practitioners' first response is likely that the client's beliefs conflict with the system rather than vice versa (Farmer *et al.*, 2012). Through the findings of the Delphi study, our study showed that physicians working in these settings demand to view the rural health system from a unique perspective in which the local culture must be acknowledged and used as a medium to accomplish health outcomes. An example is how difficult it is to connect rural or remote communities without recognizing how to provide appropriate language with their specific culture. For instance, a study conducted in West Sumatera, Indonesia, reported collaboration with community and religious leaders to engage the community and disseminate information about the tuberculosis program. These leaders were also included as health communication channels to enhance community outreach. Additionally, a cultural approach was used for health promotion and education to act as a communication channel to improve the population's awareness of tuberculosis among Solok and Mentawai populations who live in quite remote areas. The study mentioned the utilization of the "saluang", a traditional folk practice of the Minangkabau ethnic group that combines music, singing and storytelling. By adapting their songs with local legends and folktales, they effectively conveyed tuberculosis messages and reduced community stigma (Machmud *et al.*, 2020). The ability to engage local stakeholders is integral to the domain of systems transformation. This example underscores critical insights that physician leaders must possess the capabilities for system thinking beyond conventional patterns when navigating particular contexts and achieving goals; which may not always require direct intervention by physicians. In these cases, we emphasize the importance of collaborative or participatory leadership by including community and religious leaders. This is because these local leaders

are the most credible people in rural or remote communities who can influence people's thoughts, emotions and actions (Olivier *et al.*, 2015).

Secondly, our research findings indicate that the domain of "engaging others" ranked second, garnering the most endorsements. Rural or remote physicians must cultivate collaboration to achieve positive health outcomes in settings frequently characterized by resource constraints and diverse health issues. For instance, a longitudinal study, reported on how the home-based newborn care intervention package in rural India after 13 years towards incidence of maternal health conditions. This study showed how supervisory physicians, community health workers, traditional birth attendants and families worked and collaborated to reduce the incidence of maternal morbidities and mortalities (Bang *et al.*, 2022). Another study in rural Mozambique reported engaged traditional healers to provide HIV patients with education, psychosocial support and counselling because they live in the same communities and have a history of delivering healthcare (Audet *et al.*, 2022). These examples highlight the critical importance of fostering engaging environments for collaboration, particularly in resource-limited settings. Physicians in these contexts must engage with others to achieve positive health outcomes, as working in isolation is not feasible. Consequently, the ability to create and sustain cooperative and collaborative environments is a vital competency for healthcare providers in such settings.

Upon further exploration, based on qualitative study findings, we found that scholars share similar views regarding the necessity for physicians to act as leaders. Physicians are required to manage health programs, organizations (primary care) and communities. We underlined that the ability to tackle cultural issues obtained attention from the majority of scholars. When we look at LEADS, it pertains to the systems transformation domain. Rural and remote communities are known to have a strong cultural heritage; therefore, physicians are expected to be able to recognize them, whilst also respecting their uniqueness. Recognizing and respecting a particular group or community is essential to developing a tailored approach (no one-size-fits-all). The transformation of the health system is feasible in specific contexts, such as rural or remote areas, provided that physician leaders are effective in embracing all stakeholders, including Indigenous peoples. For instance, an ethnographic and focus group discussion conducted among women from ethnic minority groups in Vietnam identified that health information was conveyed in a didactic, one-way manner by doctors and other health professionals and that written information (such as the maternal and child health handbook) was relied upon rather than interpersonal communication (McKinn *et al.*, 2017). Lack of awareness regarding local health needs will impede the attainment of health outcomes and ultimately will not lead to any beneficial transformation in the rural or remote healthcare system. Furthermore, we also underscored that the majority of scholars have shown interest in the capability of physicians to collaborate with primary care staff and rural communities to achieve health outcomes. According to LEADS, this capability is included in the engage others domain. Challenges in rural and remote areas are complex issues; therefore, physicians in these settings must create engaging environments so primary care personnel and local communities can support and contribute. Local residents are significant stakeholders. To foster collaboration, physician leaders must build trust and good communication among rural and remote communities. For example, a qualitative study conducted in Myanmar on minority groups reported that health workers were able to build trust among ethnic communities, which enabled them to invite ethnic groups for vaccination that had previously refused to be vaccinated (Biesty *et al.*, 2021).

In response to the importance of physician leadership curricula, the majority of our respondents noted that such curricula often receive minimal attention, are delivered implicitly, and require more emphasis on rural and remote contexts. Taking into consideration the fact that Indonesia, in particular, still has many rural and remote areas with their own unique challenges,

a qualitative study conducted in Indonesia identified the current knowledge and competencies necessary to practise medicine effectively in underserved, border and outer-island areas of Indonesia, by inviting policymakers, district health officers, secondary healthcare facility staff, primary care staff and community health workers. One of the findings is that to establish a healthcare system that is both resilient and effective, it is necessary to improve leadership skills through the acquisition of programme management skills. An additional finding concerning medical curricula is that medical schools in Indonesia have initiated to include health program management in their curricula to align with the national health system, but gaps in implementation lead to superficial learning (Sebong *et al*., 2024). In a comparable endeavour, a study conducted in the Zamboanga Peninsula of the Philippines revealed that a medical school implemented a community-engaged medical education model that prioritized interdependent and reciprocally beneficial partnerships between the communities it serves and medical schools to emphasize the significance of collaboration with rural communities (Punzalan *et al*., 2023).

Furthermore, scholars also have demonstrated that developing physician leadership curricula specifically tailored to the needs of rural and remote areas can have a substantial impact. By incorporating Indonesia's unique cultural values and context, these curricula can cultivate a distinct set of leadership skills. These skills can serve as valuable lessons for other countries with similar Asian cultures, such as Southeast Asian ones. This tailored approach not only addresses the specific challenges faced in rural and remote regions but also offers a framework that can be adapted by neighbouring countries to enhance their healthcare leadership.

Implication for curriculum

The primary objective of this study was to formulate leadership competencies for primary care physicians in rural and remote settings. However, given the diverse cultural differences and varying resource availability across Indonesia's rural and remote environments, the implementation of these competencies may require significant adaptation. Therefore, it is crucial to examine how these 41 attributes are integrated into medical curricula to ensure their effective application.

The consensus of 41 attributes and the findings from the qualitative study offer a comprehensive overview of the leadership skills required in low-resource settings. This serves as a valuable reference for medical schools in designing leadership development programs within their curricula. This approach aligns with practices in many developed countries, such as Australia, where similar consensus methods have been used to cultivate physician leaders in rural and remote areas (Bond and Chong, 2020; Martin *et al*., 2019). We identified two domains – systems transformation and engage others – that scored highly among participants, indicating, according to the expert panel, that certain attributes within these domains are particularly desirable in rural and remote settings. As we can see the findings as illustrated in Table 3, indicated that the attribute of identifying issues, solving problems and designing and implementing effective processes across systems and stakeholders achieved the highest mean in the domain of systems transformation. Concurrently, the attribute of active listening achieved the greatest mean score in the domain of engage others. Accordingly, we suggest that educational leaders and relevant stakeholders in medical institutions should acknowledge these two attributes need further attention. Moreover, while most leadership curricula encompass a broad range of skills, they can be designed and tailored to fit the specific context in which leadership is practised. Consequently, we recommend focusing on three key points when designing and developing leadership curricula:

(1) Practice-based learning;
(2) Innovative curricula; and
(3) System-change orientation.

The first point of focus is *practice-based learning*. The literature suggests that leadership skills are most effectively acquired through practice or experience (McCall, 2004). Experiential learning allows learners to personally engage with concepts, thereby enhancing their understanding and real-world applicability (Kolb and Kolb, 2017). For example, based on the interviews (theme 2), we indicated that extracurricular programs can offer valuable leadership experiences and aid in the development of leadership skills (McCall, 2004). To enhance the leadership capabilities of primary care physicians in rural or remote areas, we propose that medical schools establish collaborations with rural or remote primary care facilities and invite them to serve as mentors. Recognizing that not all students will inherently learn from their experiences, mentoring is crucial to making these experiences meaningful. A study noted that many leadership skills critical to the success of physician leaders are best acquired through one-on-one mentoring, which is essential for their development and effectiveness (Khatana *et al.*, 2017). This personalized approach facilitates the acquisition of nuanced skills and insights that are vital for effective leadership in medical contexts.

The second focal point is *innovative curricula*. Physicians, as key stakeholders in rural and remote health systems, must remain mindful and adaptable to the unique challenges of these settings. Consequently, medical schools should use suitable learning methods and offer diverse learning experiences to enhance leadership skills identified in the consensus. This can be achieved by implementing innovative curricula, such as experience-based learning and project-based learning related to rural or remote health issues. These methods foster essential competencies like critical and creative thinking, which are crucial for professional success in rural or remote environments. An innovative curriculum also encourages medical students to develop specific, context-sensitive approaches rather than generalized solutions (no one-size-fits-all solution). For instance, students can learn to treat rural or remote communities in a culturally safe manner, recognizing the importance of local cultural and social norms.

Finally, the third focus is o*n system-change orientation*. We anticipate that rural and remote health systems will undergo gradual development in the future. Consequently, it is imperative that medical students receive comprehensive training to acquire the skills necessary to meet the evolving needs of these healthcare systems (Skochelak and Stack, 2017). As a result, medical education should emphasize the importance of their roles within rural and remote healthcare settings from the early stages of their training. Equipped with this knowledge and skill set, students will be better prepared to operate at an advanced systems level and to implement positive changes within these healthcare environments. Literature states that qualified physician leaders are crucial for driving health system improvement (Denis and Van Gestel, 2016).

In addition to recommending the incorporation of the three key points when designing and developing leadership curricula, we also emphasize the importance of monitoring and evaluating the effectiveness of the teaching and learning process. These measures should be based on well-defined principles of teaching and learning evaluation. Such a systematic approach will ensure that the curriculum not only imparts the necessary leadership skills but also continuously improves through feedback and rigorous evaluation. This continuous improvement process is crucial for adapting to the evolving needs of healthcare education and practice.

Our study possesses several strengths. Firstly, it encompassed six distinct regions, each representing one of Indonesia's main islands, and engaged six different medical schools located across the western, central and eastern parts of the country. Secondly, we included five distinct expert panels, offering a comprehensive perspective. Finally, we used mixed methods to capture a broad range of insights both quantitatively and qualitatively. However, we also recognize certain limitations. Due to the relatively small sample size, the findings should be interpreted and applied within their specific contexts. We underscore the potential issues of variation and overgeneralization in the contextual interpretations, in alignment with the study's objectives.

Conclusion

Our study establishes a consensus and offers a scientific perspective on the leadership competencies necessary for primary care physicians in rural and remote areas, tailored to the specific requirements of low-resource settings. In using the LEADS framework, which encompasses the concept of "from self to system", this consensus provides a crucial resource and rationale for relevant stakeholders involved in medical education to inform decision-making and address leadership challenges in these contexts.

Our findings suggest that the domains of systems transformation and engaging others are regarded as the most crucial for physicians working in rural and remote environments. Integrating targeted leadership training into medical curricula that prioritize these two domains while still addressing other essential domains will prepare future physicians to navigate and enhance the complex healthcare landscapes they will encounter. This strategic alignment between educational frameworks and healthcare needs ensures graduates are well-equipped to promote health equity and deliver high-quality care in underserved regions, thereby improving overall health outcomes across Indonesia.

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Appendix 1

Round 1

Participant Characteristics

Please answer the following questions by placing a check mark (√) and/or filling in the blanks where appropriate

Gender	:	☐ Male
	:	☐ Female
Age	:	____ years
Educational background	:	☐ Public health
	:	☐ Family medicine
		☐ Specialist (please specify: _____)
		☐ Medical education/ health professions education
Years of work experience in the workplace	:	____ years
I have a rural or remote background	:	☐ No
		☐ Yes
I have a leadership role in my current workplace	:	☐ No
		☐ Yes, please specify: _____
		_____
		_____

We present five true stories (representing five LEADS Framework domains). Those are the actual conditions rural and remote primary care physicians face when practising in constrained environments. These stories will probably inspire participants to suggest which leadership capabilities should be taught in Indonesian medical school curricula.

Story 1 illustrates the domain of the Lead self.

Dr. Budi and his primary care team will travel to a village located across the river to provide community health services. They, therefore, must travel the river by traditional boat for more than three hours to reach this village, which is the farthest village from primary care. The boat was not available every day. Furthermore, it is quite dangerous if it rains heavily. In this area, it is difficult to get a phone signal. Dr. Budi and the team usually posted status updates on social media before travelling to this location to notify their families that they were on duty in the remote village. Even though Dr. Budi provides health services in remote and very remote areas and works with limited health resources, he constantly tries to persuade himself that he must improve his knowledge and skills throughout his life (long life learning) to provide the community with better health services.

Story 2 illustrates the domain of the Engage others.

Dr. Budi and his primary care team had an experience when they referred a patient in the evening to a hospital that was more than 40 kilometres away from primary care. Because of the heavy rain at the

time, the ambulance was unable to pass the road, which was coated thick with muck. As the ambulance became stuck in the mud, Dr. Budi attempted to communicate with residents, and the community then assisted in pulling the ambulance by using personal vehicles (owned by one of the community members). Dr. Budi was grateful because his primary care team and rural community were always willing to help and encourage the success of the primary care program. He also regularly communicates with the local health office to report and coordinate the current state of primary care. He is also concerned about the needs of his residents because he believes that improving the health of rural communities is critical.

Story 3 illustrates the domain of the Achieve results.

As a rural primary care physician, Dr. Budi has recognized that some areas where the residents live are hard to reach because of steep hills and rivers (people have to use a boat to cross the river). If the residents have a health problem, it will be so difficult for them to reach primary care. He then discusses with the local community regarding solving this issue. Hence, he created a program called 'Saweu Ureung Saket' [English: visiting a sick person]. So, if someone gets sick, we visit the patient(s) and provide health services for them. This program then was included in the 45 national-level innovation programs of the Ministry of Health of the Republic of Indonesia. Anyhow, Dr. Budi also monitors/controls how to improve this program by communicating with residents to achieve better health outcomes.

Story 4 illustrates the domain of the Develop coalitions.

Dr. Dewi and her primary care team are going to conduct a vaccination program in his work area. She obtained the information from her staff that most of the residents refuse to be vaccinated (because of forbidden and permitted issues). So, she attempts to bargain with and educate the residents, religious leaders, and local community leaders. These leaders then wanted to assist in educating the community. Finally, most individuals wanted to embrace the vaccine, albeit a tiny percentage still refused. Dr. Dewi then realized that she needed to learn more about how to approach the community.

Story 5 illustrates the domain of the Systems transformation.

As a rural primary care physician, Dr. Dewi recognized that she needs to be adaptable to face obstacles such as limited infrastructure and healthcare resources (e.g. limited primary care staff, lack of medicines and materials, and anything else required to provide healthcare services). To overcome the lack of skilled primary care staff, she attempted to educate the primary care staff with many strategies. She then created 'Senin Pintar' [English: Smart Monday] to increase literacy, foster enthusiasm for learning, and practice public speaking. So, on Mondays, the primary care staff have to present one learning material. They can choose any material linked to health services such as cleaning a wound or even general information like how to turn the computer on or off.

Please select capabilities that, in your view, are most essential for rural and remote primary care physicians in supporting their leadership when they practice in rural and remote settings and, therefore, must be taught in Indonesian medical school curricula by placing a check mark (√).
A competent physician leader…

No.	Attributes	Yes, must be included	No, should be left out
1	is aware of their own assumptions, beliefs, and principles		
2	is aware of their own strengths and limitations		
3	takes responsibility for their own performance		
4	takes responsibility for their own health		
5	actively seeks opportunities and challenges for personal learning, character building and growth		
6	models qualities such as honesty, integrity, resilience and confidence		
7	is genuine and passionate		
8	gains the respect of their community members and peers		
9	is comfortable in their own shoes		
10	understands when is the right time to pass on information		
11	knows who they are, where they come from and is proud of that grounding, for it is their identity		
12	supports and challenges others to achieve professional goals		
13	supports and challenges others to achieve personal goals		
14	creates engaging environments in which others have meaningful opportunities to contribute		
15	ensures that resources are available to fulfil expected responsibilities		
16	listens well and encourages an open exchange of information and ideas using appropriate communication media		
17	facilitates environments of collaboration and cooperation to achieve results		
18	fosters leadership across the community		
19	wants to hear the information first-hand		
20	takes time to digest what they are hearing		
21	listens more, talks less, and asks questions		
22	represents active listening		
23	encourages the community to take the lead		
24	wants to understand the commitment being made and to be assured it will positively affect their community		
25	inspires vision by identifying, establishing, and communicating clear and meaningful expectations and outcomes		
26	integrates organisational missions and values with reliable, valid evidence to make decisions		
27	acts in a manner consistent with organisational values to provide effective and efficient public-centred service		
28	assesses and evaluates outcomes		
29	compares the results against established benchmarks		
30	corrects the course as appropriate		
31	invites the community to set the direction		
32	creates a space where everyone has an opportunity to speak and learn from each other regardless of who they are		
33	understands that cultural safety is more than a history lesson (it is about opening dialogue with many different people about wellness; in this sense, the leader creates the appropriate conditions for this dialogue and joint learning to take place)		
34	must be in an environment that supports ownership and self-governance		
35	creates connections, trust and shared meanings with individuals and groups		

LHS

No.	Attributes	Yes, must be included	No, should be left out
36	facilitates collaboration, cooperation and coalitions among diverse groups and perspectives with the aim to improve service		
37	employs methods to gather intelligence		
38	encourages an open exchange of information		
39	uses quality evidence to influence action across the system		
40	shows a political astuteness (adeptly uses skills, knowledge, and judgements to shape an environment that will influence the organisation's decision-making process)		
41	can negotiate through conflict		
42	can mobilise people		
43	can develop community trust (i.e. the community trusts that what they say is true)		
44	invests in getting to know the people in the community so that they learn more about how the community operates		
45	nurtures relationships over time; rather than visiting the community once, the competent leader is dedicated to long-term relationships		
46	passes forward information and knowledge		
47	protects the wisdom of the past and uses it to educate the future		
48	recognises that knowledge can come from many different sources		
49	acknowledges that historic agreements have a key place in indigenous history and are therefore foundational to many conversations		
50	thinks analytically and conceptually		
51	questions and challenges the status quo (thereby effecting positive change and fostering innovation)		
52	can identify issues, solve problems, and design and implement effective processes across systems and stakeholders		
53	creates a climate of continuous improvement and creativity aimed at systemic change		
54	scans the environment for ideas, best practices, and emerging trends (and, in doing so, makes maximum use of the resources available)		
55	actively contributes to change processes that improve health service delivery		
56	recognises that communities and nations need to be able to control their systems and make their own decisions		
57	aims to include all healthcare providers and indigenous people (can organise and manage a heterogeneous group, whilst respecting their uniqueness in an empathetic, unbiased way)		
58	allows the community to set the agenda and priorities		
59	recognises that each community is unique and that each community, therefore, requires a tailored approach; there is no one-size-fits-all		
60	realises that today's decisions impact the leaders of tomorrow as well as their future quality of life		
61	acknowledge that health transformation pushes limits to promote required changes		
62	accounts for and modifies timelines, so as not to rush community decision-making		

Appendix 2

Round 2

Participant Characteristics

Please answer the following questions by placing a check mark (√) and/or filling in the blanks where appropriate.

Gender	:	☐ Male
	:	☐ Female
Age	:	____ years
Educational background	:	☐ Public health
	:	☐ Family medicine
		☐ Specialist (please specify: _____)
		☐ Medical education/ health professions education
Years of work experience in the workplace	:	____ years
I have a rural or remote background	:	☐ No
		☐ Yes
I have a leadership role in my current workplace	:	☐ No
		☐ Yes, please specify: _____
		_____
		_____

We present five true stories (representing five LEADS Framework domains). Those are the actual conditions rural and remote primary care physicians face when practising in constrained environments. These stories will probably inspire participants to suggest which leadership traits should be taught in Indonesian medical school curricula.

Story 1 illustrates the domain of the Lead self

Dr. Budi and his primary care team will travel to a village located across the river to provide community health services. They, therefore, must travel the river by traditional boat for more than three hours to reach this village, which is the farthest village from primary care. The boat was not available every day. Furthermore, it is quite dangerous if it rains heavily. In this area, it is difficult to get a phone signal. Dr. Budi and the team usually posted status updates on social media before travelling to this location to notify their families that they were on duty in the remote village. Even though Dr. Budi provides health services in remote and very remote areas and works with limited health resources, he constantly tries to persuade himself that he must improve his knowledge and skills throughout his life (long life learning) to provide the community with better health services.

Story 2 illustrates the domain of the Engage others.

Dr. Budi and his primary care team had an experience when they referred a patient in the evening to a hospital that was more than 40 kilometres away from primary care. Because of the heavy rain at the time, the ambulance was unable to pass the road, which was coated thick with muck. As the ambulance

became stuck in the mud, Dr. Budi attempted to communicate with residents, and the community then assisted in pulling the ambulance by using personal vehicles (owned by one of the community members). Dr. Budi was grateful because his primary care team and rural community were always willing to help and encourage the success of the primary care program. He also regularly communicates with the local health office to report and coordinate the current state of primary care. He is also concerned about the needs of his residents because he believes that improving the health of rural communities is critical.

Story 3 illustrates the domain of the Achieve results.

As a rural primary care physician, Dr. Budi has recognized that some areas where the residents live are hard to reach because of steep hills and rivers (people have to use a boat to cross the river). If the residents have a health problem, it will be so difficult for them to reach primary care. He then discusses with the local community regarding solving this issue. Hence, he created a program called 'Saweu Ureung Saket' [English: visiting a sick person]. So, if someone gets sick, we visit the patient(s) and provide health services for them. This program then was included in the 45 national-level innovation programs of the Ministry of Health of the Republic of Indonesia. Anyhow, Dr. Budi also monitors/controls how to improve this program by communicating with residents to achieve better health outcomes.

Story 4 illustrates the domain of the Develop coalitions.

Dr. Dewi and her primary care team are going to conduct a vaccination program in his work area. She obtained the information from her staff that most of the residents refuse to be vaccinated (because of forbidden and permitted issues). So, she attempts to bargain with and educate the residents, religious leaders, and local community leaders. These leaders then wanted to assist in educating the community. Finally, most individuals wanted to embrace the vaccine, albeit a tiny percentage still refused. Dr. Dewi then realized that she needed to learn more about how to approach the community.

Story 5 illustrates the domain of the Systems transformation.

As a rural primary care physician, Dr. Dewi recognized that she needs to be adaptable to face obstacles such as limited infrastructure and healthcare resources (e.g. limited primary care staff, lack of medicines and materials, and anything else required to provide healthcare services). To overcome the lack of skilled primary care staff, she attempted to educate the primary care staff with many strategies. She then created 'Senin Pintar' [English: Smart Monday] to increase literacy, foster enthusiasm for learning, and practice public speaking. So, on Mondays, the primary care staff have to present one learning material. They can choose any material linked to health services such as cleaning a wound or even general information like how to turn the computer on or off.

Please select capabilities that, in your view, are most essential for rural and remote primary care physicians in supporting their leadership when they practice in rural and remote settings and, therefore, must be taught in Indonesian medical school curricula by placing a check mark (√).
A competent physician leader…

No.	Attributes	Strongly agree	Agree	Disagree	Strongly disagree
1	is aware of their own assumptions, beliefs, and principles				
2	is aware of their own strengths and limitations				
3	takes responsibility for their own performance				
4	takes responsibility for their own health				
5	actively seeks opportunities and challenges for personal learning, character building and growth				
6	models qualities such as honesty, integrity, resilience and confidence				
7	is genuine and passionate				
8	is comfortable in their own shoes				
9	understands when is the right time to pass on information				
10	supports and challenges others to achieve professional goals				
11	creates engaging environments in which others have meaningful opportunities to contribute				
12	ensures that resources are available to fulfil expected responsibilities				
13	listens well and encourages an open exchange of information and ideas using appropriate communication media				
14	facilitates environments of collaboration and cooperation to achieve results				
15	fosters leadership across the community				
16	wants to hear the information first-hand				
17	represents active listening				
18	wants to understand the commitment being made and to be assured it will positively affect their community				
19	inspires vision by identifying, establishing, and communicating clear and meaningful expectations and outcomes				
20	integrates organisational missions and values with reliable, valid evidence to make decisions				
21	acts in a manner consistent with organisational values to provide effective and efficient public-centered service				
22	assesses and evaluates outcomes				
23	compares the results against established benchmarks				
24	corrects the course as appropriate				
25	invites the community to set the direction				
26	creates a space where everyone has an opportunity to speak and learn from each other regardless of who they are				
27	understands that cultural safety is more than a history lesson (it is about opening dialogue with many different people about wellness; in this sense, the leader creates the appropriate conditions for this dialogue and joint learning to take place)				
28	creates connections, trust and shared meanings with individuals and groups				
29	facilitates collaboration, cooperation and coalitions among diverse groups and perspectives with the aim to improve service				
30	employs methods to gather intelligence				

LHS

No.	Attributes	Strongly agree	Agree	Disagree	Strongly disagree
31	encourages an open exchange of information				
32	uses quality evidence to influence action across the system				
33	shows a political astuteness (adeptly uses skills, knowledge, and judgements to shape an environment that will influence the organization's decision-making process)				
34	can negotiate through conflict				
35	invests in getting to know the people in the community so that they learn more about how the community operates				
36	nurtures relationships over time; rather than visiting the community once, the competent leader is dedicated to long-term relationships				
37	passes forward information and knowledge				
38	protects the wisdom of the past and uses it to educate the future				
39	recognizes that knowledge can come from many different sources				
40	acknowledges that historic agreements have a key place in indigenous history and are therefore foundational to many conversations				
41	thinks analytically and conceptually				
42	questions and challenges the status quo (thereby effecting positive change and fostering innovation)				
43	can identify issues, solve problems, and design and implement effective processes across systems and stakeholders				
44	creates a climate of continuous improvement and creativity aimed at systemic change				
45	scans the environment for ideas, best practices, and emerging trends (and, in doing so, makes maximum use of the resources available)				
46	actively contributes to change processes that improve health service delivery				
47	recognizes that communities and nations need to be able to control their systems and make their own decisions				
48	aims to include all healthcare providers and indigenous people (can organize and manage a heterogeneous group, whilst respecting their uniqueness in an empathetic, unbiased way)				
49	recognizes that each community is unique, and that each community, therefore, requires a tailored approach; there is no one-size-fits-all				
50	realizes that today's decisions impact the leaders of tomorrow as well as their future quality of life				
51	acknowledge that health transformation pushes limits to promote required changes				
52	accounts for and modifies timelines, so as not to rush community decision-making				

Appendix 3

Interview guide

1. Do you believe that the concept of physician leadership is particularly important for physicians working in rural and remote health systems? Please provide the example(s).
2. Does your institution provide a curriculum that emphasizes physician leadership development, particularly as it pertains to physicians working in rural and remote health systems?
3. Why do you believe it is necessary to define a physician leadership development curriculum, particularly for primary care doctors tailored to Indonesia's rural and remote health systems?
4. How can we integrate a physician leadership development curriculum that is tailored to rural or remote practices and contexts?
5. Will this curriculum be limited to Indonesia, or will it have a wider impact?

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