



Barriers in Pharmaceutical Services Focusing on Stunting and the Need for Digital Learning Media: A Qualitative Study of Community Pharmacists

Firdawati Amir Parumpu^{1,4}, Pratiwi Wikaningtyas¹, Satibi Satibi², Septi Muharni³, Ananda Putri Purwanto⁴, Kusnandar Anggadiredja^{1*}

¹School of Pharmacy, Institut Teknologi Bandung, Bandung, Jawa Barat, Indonesia

²Faculty of Pharmacy, Universitas Gadjah Mada, Yogyakarta, Daerah Istimewa Yogyakarta, Indonesia

³Department of Clinical Pharmacy and Pharmacy Community, Sekolah Tinggi Ilmu Farmasi Riau, Pekanbaru, Riau, Indonesia

⁴Faculty of Mathematics and Natural Sciences, Universitas Tadulako, Palu, Sulawesi Tengah, Indonesia

*Corresponding Author: E-mail: kusnandar@fa.itb.ac.id

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ABSTRACT

Introduction: The strategic role of community pharmacists in pharmacy services focused on stunting in Indonesia is still limited, thus requiring resource support. The presence of digital learning media is expected to enhance competence. This study explores the barriers to implementing pharmacy services focused on stunting and the needs in developing digital learning media to improve the competence of community pharmacists.

Methods: A descriptive-qualitative study with structured interviews covering two main research topics. Community pharmacists who are active in community facilities were recruited using purposive sampling techniques and have undergone interview consent.

Results: The research findings are mapped into two main domains, namely the barriers to the implementation of stunting-focused pharmaceutical services and the need for digital learning media to enhance the competence of community pharmacists. Barriers are found in 1) internal factors, 2) external factors, and 3) system factors, it indicates an urgent need for digital learning media with 4) comprehensive materials related to stunting, 5) specific competence, 6) management guidelines, and 7) integration of digital technology in pharmaceutical services related to stunting, which are highly needed to improve the competence of community pharmacists in implementing stunting-focused pharmaceutical services in Indonesia.

Conclusions: The finding of converging obstacles faced by community pharmacists in pharmaceutical services focusing on stunting and the enthusiasm for developing digital learning media to improve community pharmacists' competence becomes a strategic solution. There needs to be resource support for community pharmacists to play a role in pharmaceutical services focused on stunting in the future.

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INTRODUCTION

Stunting is a complex, multidimensional national public health issue in Indonesia, characterized by growth disorders in children due to multifactorial factors, namely poor maternal nutrition during pregnancy, inadequate care for child growth and development, poor environmental and sanitation conditions, and socioeconomic factors (1). Based on data from the Indonesian Health Survey (SKI), the prevalence of stunting in Indonesia in 2023 was 21.5%, indicating a 7.5% gap from the government's 2024 target of 14% (2). Stunting not only affects physical growth but can also have long-term implications for an individual's cognitive development, learning ability, and productivity. The high prevalence of stunting in Indonesia is a primary reason to strengthen interventions through cross-professional collaboration to optimize the role of health workers, especially community pharmacists, in community pharmacy service programs.

Community pharmacists hold a strategic position in managing nutrition and weight-loss services (3), where stunting prevention activities can be integrated, including comprehensive and stunting-specific pharmacy services, such as nutrition education and counselling on the rational use of nutritional supplements that can support stunting prevention efforts. In some lower middle-income countries, community pharmacists play an important role in healthcare services, with critical decisions regarding the further management of patient conditions made during that interaction (4). Previous studies have shown that the skills and capacity of community pharmacists' competencies in clinical practice are not yet optimal, it is reported that only 37% of pharmacists have good knowledge related to nutrition services. (5) Qualitatively, key challenges identified include fragmented information and limited availability of learning resources that are adaptive to pharmacists' work patterns. This phenomenon underscores a significant gap between the needs of pharmacists to meet competency standards and the reality in practice. In this context, digital transformation in the field of health education, particularly pharmacy, offers a strategic and innovative solution. Digital learning methods and the use of digital media have been proven to enhance the accessibility of materials continuously and provide higher learning effectiveness compared to conventional methods by 1.93, as well as increase satisfaction levels and positively impact costs (6). The development of a user-centered and integrative digital learning platform is projected not only to improve long-term understanding but also to create sustainable educational efficiency suitable for the working patterns of community pharmacists. However, the quality of learning media depends heavily on the background, as it helps identify real user barriers and needs, ensuring that the developed learning tools are relevant and applicable and support the improvement of professional competencies (7).

Qualitative research with a descriptive approach is an appropriate method for exploring in depth the perceptions, experiences, and needs of community pharmacists practicing in community facilities or primary care in the development of digital learning media. Through a systematic exploration of these barriers and needs, an empirical basis is established for designing digital learning media that are contextually relevant and comprehensive to enhance community pharmacists' competence for future services. Thus, this study is the first research in Indonesia to identify barriers in implementing stunting-focused pharmaceutical services among community pharmacists and to connect the need to enhance the competency of stunting-focused pharmaceutical services for community pharmacists through digital learning media. This research is expected to contribute to the implementation of appropriate policies and resource support for community pharmacists in providing stunting-focused pharmaceutical services in community practice facilities, in order to support the national stunting prevention strategy program of the Government of the Republic of Indonesia.

METHODS

Study design

This qualitative research uses a descriptive approach on community pharmacists practicing in Indonesia. Structured interviews were conducted using the Standardized Open-Ended Interview (SOEI) technique, which ensures openness and richness in participant responses while maintaining the same questions and fixed order for all participants, resulting in textual qualitative data for thematic analysis while maintaining high dependability consistency in the interview process (8). This study also adopts a Hybrid Thematic Framework, developed based on the dual objectives of the research: the barriers to implementing pharmaceutical services focused on stunting and the need for digital learning media to improve community pharmacists' competence. This structure is used to ensure that both domains are adequately addressed within the limited research timeframe. Next, the merging of sensitizing concepts from the determination of emergent themes is carried out on each theme that has been established, this

approach can bridge exploration (inductive) with systematic analysis (deductive) in specific research (9). The two-part interview guide was prepared and internally validated by the research team. Two topic areas were prepared by the research team and validated by an expert panel comprising academics and practitioners in pharmacy services. The interview guide was registered for copyright at the Ministry of Law and Human Rights of the Republic of Indonesia (Copyright Number: EC002023106614). The interview questions were prepared in simple language and scientific vocabulary to elicit uniform, focused answers. The two main parts and the two main topics discussed are as follows:

Sociodemographic section: this section aims to collect participant profiles and characterization data for the purpose of correlating interview results.

Sociodemographic section: this section aims to collect participant profiles and characterization data to correlate interview results.

Research questions section: This section is intended to outline the questions for participants according to the predetermined topic, as follows: 1) Barrier topic: this question is designed to identify the barriers community pharmacists face in providing stunting-focused pharmacy services. 2) Needs topic: this question is designed to identify the needs expected from community pharmacists in the development of digital learning media to improve pharmacy service competence focused on stunting.

Informant Sampling and Inclusion Criteria

This study involved community pharmacists who are actively practicing in community pharmacy facilities (pharmacies, clinics, and health centers) in Indonesia. Sampling with maximum variation was conducted to ensure and capture representative and broad perspectives reflecting the research sites. Participants were recruited from four categories of research areas based on the number of pharmacists and the prevalence of stunting, as well as various practice facilities. The sampling areas were categorized into four groups: 1) high number of pharmacists – high prevalence of stunting, 2) low number of pharmacists – high prevalence of stunting, 3) low number of pharmacists – low prevalence of stunting, and 4) high number of pharmacists – low prevalence of stunting. In four provinces (mountainous Papua, Southwest Papua, South Papua, and Central Papua), no values were found in the available primary data sources. Regional grouping of the research area is used to ensure a broad geographical coverage. However, the main focus of the analysis is on the type of practice facilities to capture systemic variations in organization. Participants were recruited using purposive sampling techniques with predetermined inclusion criteria, including: (a) pharmacists practicing in community pharmacy facilities in Indonesia, (b) pharmacists with a minimum of five years of work experience in pharmacy services, (c) pharmacists with an active SIPA (pharmacist practice permit) number, and (d) pharmacists willing to participate in the study. Each potential participant was contacted individually via phone, E-mail, and social media to provide a brief overview of the study. Prospective participants who express interest and commit to participating in the research are then contacted further to receive information and interview guidelines, after which the time, place, and meeting medium are determined.

Table 1. Research Area Grouping

Area group 1	Area group 3
South Sulawesi	Jambi
Southeast Sulawesi	North Sulawesi
East Kalimantan	Bengkulu
West Sumatra	Bangka Belitung Islands
South Kalimantan	Riau Islands
West Nusa Tenggara	North Kalimantan
Area group 2	Area group 4
West Java	West Kalimantan
East Java	Central Kalimantan
Central Java	East Nusa Tenggara
Dk Jakarta	Nangroe Aceh Darussalam
DI Yogyakarta	Central Sulawesi
Banten	Papua
North Sumatra	West Papua
Riau	Maluku

Bali
South Sumatra
Lampung

Gorontalo
North Maluku
West Sulawesi

Data Collection

Interviews were conducted and recorded using several meeting methods, including face-to-face, Zoom, and WhatsApp Video Call, all participants are willing to participate in the first invitation. The interviews were conducted over a period of six months (from December 2023 to May 2024), with an estimated duration of 20-25 minutes, and recorded using recording devices for manual transcription by the research team. The interview process began with introductions, reading the provisions in the interview guide, including confidentiality and data storage, and obtaining consent to record. Interview questions were asked sequentially according to the research topics, and the research assistant's notes during the interview were cross-checked and included in the files during transcription. There are no repeated interviews for each participant in this study. The dual position of the researcher as both a practicing pharmacist and an academic raises awareness while also demanding consistency in the practice of reflexivity throughout the entire research process, enabling the researcher to recognize and manage potential subjectivity that inherently and intrinsically affects the researcher (Finlay, 2002). As an insider sharing the same professional background as the participants, the researcher gains advantages and ease in building close connections and trust (rapport), as well as a deep understanding of the context and technical terms. However, the potential for bias can be confirmed, and overfamiliarity may affect the accuracy and rigor of the research methodology (Hammersley & Atkinson, 2019). Researchers anticipate and minimize these risks by systematically applying strategies through critical distance techniques, triangulating various participant data sources, confirming participants' interpretations through member checking, and creating an external audit trail to ensure the objectivity of the analysis and enhance the validity and credibility of the research findings.

Data analysis

Each interview recording was transcribed word-for-word into a word document for each informant. This stage takes about two to three hours and is conducted after the interview to ensure that all topics have been covered. Four researchers manually selected data with Microsoft Excel App for in-depth and reflective analysis while maintaining an objective attitude. Data analysis was conducted through six stages of Braun & Clarke's thematic analysis (10). The stages began with 1) data familiarization, 2) creating initial codes using a codebook, and 3) continued to the development and review of themes through thematic mapping. To mitigate subjective bias and strengthen inter-researcher reliability, two researchers (FAP and SM) 4) conducted coding independently, with any disagreements resolved through 5) collaborative discussions (FAP, KA, PW, SS, and SM) until 6) consensus was reached. All documentation processes, including reflective notes and analysis logs, were preserved as an audit trail (FAP and APP) to ensure that the findings authentically represented the pharmacists' perspectives without interference from the researchers' academic positions. This process took place from August to November 2024.

Data saturation was reached with the ninth participant, the homogeneous participants indicated that data saturation is also influenced by the stability of the codebook and the representativeness of the themes (11). Code stability was achieved with a minimal number of participants due to the uniform focus of the questions (12). After the ninth participant, no new major themes emerged. Although some additional sub-codes were identified, these findings did not alter the main conceptual structure and only enriched the dimensions of the existing major themes (Table 2). Data collection was then concluded because the researcher determined that adequate stability and conceptual density had been achieved to answer the research questions.

Table 2. Data saturation grid

ID	New Sub-Code	Total Sub-Code	New Main Theme	Total Main Theme	Stability Percentation (%)	Main Code Description	Saturation Status
Topic I – Barriers							
IR1	3	3	2	2	66,67%	Internal Barriers, Systemic Barriers	initiation
IR2	2	5	0	2	66,67%	The new theme does not appear	Development
IR3	2	7	0	2	66,67%	The new theme does not appear	Development
IR4	4	11	0	2	66,67%	The new theme does not appear	Development
IR5	3	14	1	3	100%	External Barriers	Development
IR6	2	16	0	3	100%	The new theme does not appear	Development
IR7	4	20	0	3	100%	Confirmation	Saturation
IR8-IR9	7	27	0	3	100%	Confirmation	Stable
Topic II - Needs							
IR1	3	3	2	2	25%	Stunting Material, Specific Competencies	Initiation
IR2	3	6	1	3	75%	Guidelines	Development
IR3	3	9	1	4	100%	Digital Technology	Development
IR4	2	11	0	4	100%	The new theme does not appear	Development
IR5	2	13	0	4	100%	The new theme does not appear	Development
IR6-IR7	5	18	0	4	100%	Confirmation	Saturation
IR8-IR9	3	21	0	4	100%	Confirmation	Stable

Ethic Statements

This study was approved by the Medical and Health Research Ethics Committee (MHREC) of the Faculty of Medicine, Public Health and Nursing, Universitas Gadjah Mada – Dr. Sardjito Hospital (Ref. No.: KE/FK/1823/EC/2023). Prospective participants provided informed consent, with key safety and data protection points explained. Participant identities were kept confidential to ensure complete privacy, and participant anonymity was confirmed using team-specific codes. Participants received an honorarium commensurate with fair market value for their involvement.

RESULTS

The demographics of the nine community pharmacists interviewed are presented in Table 3. Most participants educational backgrounds including a bachelor's degree in pharmacy (55.56%) and a master's degree in pharmaceutical sciences (44.44%). Most of them worked as pharmacists (55.56%), while others also served as owners of their facilities (44.44%).

Table 3. Demographics of respondents

ID	Gender	Age	Position	Level of Education	Year of Experience	Practice Area	Practice Facilities
IR1	Female	30	Pharmacist in charge and facility owner	Master (S2)	5	Central Sulawesi	Clinic
IR2	Female	32	Pharmacist in charge	Master (S2)	5	Bali	Public Health Center
IR3	Female	43	Pharmacist in charge and facility owner	Master (S2)	17	West Java	Clinic
IR4	Male	28	Pharmacist in charge and facility owner	Bachelor (S1)	5	Riau Island	Pharmacy
IR5	Female	35	Pharmacist in charge	Bachelor (S1)	6	Gorontalo	Public Health Center
IR6	Female	32	Pharmacist in charge	Bachelor (S1)	10	West Papua	Clinic
IR7	Male	36	Pharmacist in charge and facility owner	Bachelor (S1)	9	Jambi	Pharmacy
IR8	Male	34	Pharmacist in charge	Master (S2)	7	South Kalimantan	Pharmacy
IR9	Female	45	Pharmacist in charge	Bachelor (S1)	18	South Sulawesi	Public Health Center

Topic I. Barriers in pharmacy services focused on stunting in community facilities

This topic aimed to identify barriers perceived by community pharmacists in pharmacy services focused on stunting in community facilities (Table 4). A study revealed that the key to the successful implementation of health programs is recognizing and understanding barriers from the outset, so that the policies set are in line with the local context and the program's effectiveness can be achieved (13). Identifying key barriers must be carried out continuously during service implementation, especially for health technology, to ensure the design of appropriate, resilient solutions that are robust enough to be adopted in the future (14)

Table 4. Thematic analysis of topic I

Topic	Main Themes	Description
Barriers in pharmaceutical services focusing on stunting	Barriers in External Factors	This theme explains the internal factors experienced, namely stemming from the limitations of professional capacity in community pharmacists, including limitations in the development of technical skills professionally and the limited number of community pharmacists in community pharmacy facilities.
	Barriers in Internal Factors	This theme explains the internal factors experienced, namely stemming from the limitations of professional capacity in community pharmacists, including limitations in the development of technical skills professionally and the limited number of community pharmacists in community pharmacy facilities
	Barriers in System Factors	This theme explains that obstacles in the implementation of pharmaceutical services related to stunting stem from limitations in the government system regarding structural support and coordinated cross-sector collaboration from professional organizations and the government for community pharmacists in community pharmacy facilities.

Barriers in External Factors

The theme of barriers to external factors reveals that obstacles in pharmacy services related to stunting stem from the knowledge, attitudes, and behaviors of the community regarding the role of pharmacists in pharmacy services focused on stunting in community facilities. Research on community pharmacists in clinics found that services were carried out by considering the economic affordability of patients as a determining factor, when supplement recommendations were given, patients usually looked for 'reasons' to avoid costs, and the behavior of

'lack of trust' towards medical staff also worsened the service. This indicates that clinical advice alone is not sufficient in the clinical setting; community pharmacists need to consider the security of patients' social and economic guarantees.

"The lack of awareness among teenagers or adult women in maintaining their health...the lack of trust in technical personnel, medical staff, and the fear of mothers, fathers, or parents in seeking treatment." (IR1-Clinic)

"Economic problems of the patient become an obstacles...besides the knowledge of the pregnant mother, after being explained and understood, it continues to the economic problem which also becomes a consideration...sometimes we have already suggested something good, but in the end, because the price of the medicine we recommended is quite expensive, especially if it needs to be taken daily, the patient makes excuses." (IR3-Clinic)

"Even though they have been informed that it is necessary by the doctor to take their calcium, the patient said that they already eat enough nutritious food." (IR6-Clinic)

At the health center level, the barriers shift to the patient's psychological aspects. The emergence of 'rejection' behavior from educated parents indicates that higher literacy skills do not guarantee acceptance of stunting examination results. In addition, deep-rooted cultural practices and 'traditional ceremony' obligations become reasons for the intensity and consistency of visits to the integrated health post. This emphasizes that in the health context, cultural resistance and parental ego are obstacles that community pharmacists need to face in pharmaceutical services focused on stunting.

"Parents' knowledge regarding stunting is still low...it's like there's denial or a feeling of not accepting that their child is indicated to have stunting...the parents are educated people (teachers), so I think knowledge is not the issue, but rather the personality of the parents (can't accept it)...there are still obstacles for children to come to the health post due to the reasons that their parents are still working, the children are still at school, and the parents are busy with traditional ceremonies." (IR2-Public health center)

In community pharmacists at pharmacies, it was found that the greatest obstacles were experienced when facing patients who were 'uncooperative' and 'less informative'. This finding indicates that 'knowledge and action' can create a significant gap, and behavior that underestimates nutritional deficiencies compared to acute illnesses was also found in patients. There is a need for strategic communication regarding risks to improve patient compliance.

"Usually patients are uncooperative, when asked to come they don't want to, citing being busy...sometimes they also forget to take the medicine every day, even though it is given for free to the pregnant women...that's the problem, they are told to come but don't, told to take the free medicine but don't show up...their knowledge about the importance of iron is lacking, so it is considered trivial...they assume they don't know how risky it is for a pregnant woman to be iron deficient." (IR4-Pharmacy)

"Sometimes patients who experience stunting are less informative, possibly due to differences in their level of knowledge...not everyone can come for treatment to share their complaints about stunting." (IR7-Pharmacy)

Barriers in Internal Factors

The theme of barriers to internal factors highlights the perceived internal barriers that originate from within the pharmacist, related to the limitations of the professional capacity of community pharmacists in pharmacy services focused on stunting, including limitations in the development of professional technical skills and the limited number of community pharmacists at community facilities. The findings in the scope of public health centers are the personal perceptions of community pharmacists regarding their 'small presence' compared to the roles of other healthcare personnel in handling stunting, and combined with personal assessments of limited abilities in technical matters such as creating digital media, this situation forces pharmacists to make efforts self-taught based on their experiences during their education. Internal barriers also lie in the pharmacists' ability to lead stunting prevention initiatives, often dominated by their self-confidence to boldly demonstrate that pharmacists can be effective 'Agents of Change'.

"The problem is I can't edit brochures like in applications such as Canva, our limitations and existence as pharmacists as healthcare workers are indeed small compared to doctors, midwives, nurses." (IR5-Public health center)

"So this is just self-taught, relating it to the knowledge we gained during college." (IR9- Public health center)

In clinical services, stunting often does not receive adequate attention, because the service model is mostly driven by the symptoms that patients want to present. As found in interview results, the service focuses on 'disease symptoms' and patient complaints, so stunting becomes something that is forgotten.

"We still haven't paid attention to stunting because what I feel when patients come, especially child patients, we only focus on their complaints...we focus more on disease symptoms when visiting the clinic." (IR6-Clinic)

Meanwhile, in pharmacies, unique challenges are faced by community pharmacists regarding their roles and professional scope. Pharmacists are expected to understand the 'physical characteristics of stunting' to support collaboration. However, support in the form of official guidelines for competency development in services is not provided. This gap is then reinforced by findings related to the lack of understanding of the 'intervention model' as perceived by community pharmacists in pharmacies.

"We have to understand the physical characteristics of stunting, because we cannot provide a diagnosis directly, so there must be information from the patient first." (IR7-Pharmacy)

"The most feasible solution is for the IAI to assign pharmacists as stunting agents or Change Agents (AOC)...the pharmacist thinks we do not understand how the intervention model is, which we have not yet understood." (IR8-Pharmacy)

Barriers in System Factors

The theme of barriers to pharmaceutical services focusing on stunting in the health system in Indonesia illustrates that the impact of limited structural support from government and non-government institutions and the lack of cross-sector coordination from professional organizations for community pharmacists in a stunting-focused pharmaceutical service system in community pharmacy facilities is very significant. This study found that in clinics, community pharmacists need assistance in the form of 'specific promotional media' for pharmaceutical staff for education, so that their promotive and preventive roles can be optimally improved. Other expected support is integrated services between private clinics and government programs in an aggressive manner, indicating that in clinical interventions, community pharmacists are ready to play a role in stunting-focused pharmaceutical services but still require support for more practical services.

"Lack of promotional media for medical personnel, especially pharmacists, to contribute in carrying out promotive, preventive, and curative activities against stunting." (IR1-Clinic)

"Unless there is assistance such as government programs that provide free services and are integrated into private clinics like ours." (IR3-Clinic)

The results of this study indicate that the effectiveness of pharmaceutical services at community health centers largely depends on systemic support outside the health sector, the involvement of urgent cross-sector authorities, such as appeals from village officials or local government to bridge communication to build public trust. In addition, the lack of direct involvement and the absence of guidelines for community pharmacists at health centers also result in minimal roles in the area of stunting. A framework is needed both clinically and administratively to initiate collaboration that can optimize the contribution of pharmacists.

"Stunting is not just a problem for health workers, but there must be a role from cross-sector authorities, such as the neighborhood head.... the neighborhood head and their superiors are not yet able to control and influence the community...the community trusts the neighborhood head more." (IR2-Public health center)

"First, we are not directly involved...lack of information due to the absence of technical guidelines on stunting for pharmacies." (IR9-Public health center)

Community pharmacists in pharmacies believe that the most critical barrier in pharmacies is the lack of clear and focused technical guidelines regarding pharmaceutical services focused on stunting from the relevant authorities and professional organizations, leading to pharmacists working without standardized direction and stunting education programs not being carried out routinely or in an integrated manner. This underscores the need for in-depth discussion at the policymaker level concerning the future and direction of pharmaceutical services focused on stunting.

"Sometimes, just for stunting education, we need, for example, brochures...sometimes we have already provided information but can no longer monitor it...there needs to be a routine visit program made in an integrated way...from the health office, there is also a lack of socialization." (IR7-Pharmacy)

"There is no clear guideline on how to handle stunting in the pharmacist area... the real challenge, as mentioned earlier, is the lack of guidelines, and secondly, the continuity of monitoring is questionable...it doesn't become a program, and there is no clear guideline on what the rules are, so clearly there are many obstacles in the field...it may not necessarily succeed if handled on our own." (IR8-Pharmacy)

Topic II. The needs of community pharmacists in developing digital learning media

This topic aims to identify the needs of community pharmacists in developing digital learning media to improve pharmacy service competence, with a focus on stunting in Indonesia (Table 5). A study of healthcare workers, including pharmacists, on digital health technology found that innovation in digital health education interventions is urgently needed to develop an international competency framework for pharmacists (15). Another study revealed that the use of technology is also claimed to enhance the clinical role of pharmacists practicing in community facilities (16).

Table 5. Thematic analysis of topic II

Topic	Main Theme	Description
The needs of community pharmacists in developing digital learning media	Comprehensive materials related to stunting	This theme explains the need for pharmacists for learning media that covers both conceptual and clinical aspects of stunting comprehensively. The material in the learning media integrates knowledge related to stunting so that pharmacists have a complete understanding in supporting efforts for the prevention and management of stunting in community facilities.
	Specific Competence	This theme explains the need for competency enhancement for pharmacists specifically in stunting services. These competencies include knowledge, attitude or behavior, and the skills of community pharmacists in providing pharmaceutical services related to stunting in community facilities.
	Management Guidelines	This theme explains the need for the preparation of management guidelines that serve as an official reference for pharmacists in carrying out integrated pharmaceutical services for patients with stunting conditions. These guidelines are used as a tool for health professionals, especially pharmacists, to ensure uniformity of practice in community facilities.
	Integration of digital technology	This theme explains the utilization of digital technology as an effective and innovative strategy in supporting services related to stunting, which can be used as a tool to strengthen the understanding and engagement reach of community pharmacists in pharmaceutical services at community facilities.

Educational materials related to pharmacy services focus on comprehensive, integrated training for community pharmacists

The pharmacist at the clinic emphasized that the availability of integrated stunting educational materials is very important, as well as the availability of interconnected sources of information, so that community pharmacists are able to provide comprehensive and consistent education to support the success of nutritional interventions in patients.

"What is most needed is material on stunting.....if all this material can be interconnected, we can use it in patient education." (IR1-Clinic)

The main focus of pharmacist services at community health centers is the quality of counseling and the accessibility of digital information that need to be optimized. Mastery of general stunting theory supports pharmacists in being able to provide optimal counseling for the stunting target group. The need for a specific digital platform (website) regarding knowledge, attitudes, and clinical skills is expected to equip pharmacists in facing challenges at healthcare facilities.

"So that when counseling in pharmacy services for the stunting intervention group according to the table, it can be done correctly and optimally by the pharmacist." (IR2-Public health center)

"Perhaps with the existence of a website, it can provide us pharmacists with information that can be passed on to patients regarding stunting issues.....the website needs to explain in detail the three aspects mentioned above, namely the knowledge, attitude, and skills of a pharmacist in providing stunting services and how to face its challenges." (IR5-Public Health Center)

The relevance of pharmaceutical competence for community pharmacists in pharmacies requires mastery of basic material regarding stunting to emphasize their role in pharmacies, particularly in-depth knowledge related to the use of supplements and their impact on stunting prevention.

"The material needed is certainly basic knowledge related to stunting, which in relation to pharmacists means the relationship between medicine and stunting." (IR7-Pharmacy)

Enhancing the specific competence of pharmacists through information, education, and skills in pharmacy services focused on stunting

The development of competencies related to stunting services is needed for pharmacists to build trust in providing information to patients, thereby creating openness in counseling. In addition, the availability of specific learning media regarding micronutrients (vitamins) for vulnerable groups, such as pregnant women and infants, is necessary to support early stunting prevention.

"So when we counsel and provide medication information to patients, they trust the information we provide and become more open." (IR1-Clinic)

"A learning website that contains basic knowledge about vitamins – vitamins for pregnant women and babies." (IR3-Clinic)

The same thing was conveyed by pharmacists at the community health center, namely technical understanding related to stunting as a basis for performing effective interprofessional collaboration with other professional health workers, so that pharmacists are able to provide relevant clinical contributions within the health team at the community health center.

"Material related to determining a child's nutritional status, whether they are experiencing stunting or malnutrition, because it is still in collaboration with nutrition experts." (IR2-Public health Center)

An urgent need was identified for pharmacists in pharmacies, namely the standardization of health promotion media specifically designed from a pharmaceutical perspective, not merely general information related to stunting. This aims for community pharmacists to have a clear professional identity and be focused on pharmaceutical services addressing stunting.

"Perhaps promotional media also need to be standardized, but from a pharmacist's perspective, not stunting in general." (IR8-Pharmacy)

Management guidelines as technical guidance for comprehensive stunting focused pharmacy services for pharmacists

The management of pharmaceutical services focused on stunting at health centers requires specific technical guidelines for case management independently according to their competence, both through pharmacological and non-pharmacological interventions.

"Management, for example, what should be done if this child is classified as stunted, as until now it has been left directly to the doctor.....it needs to be managed in terms of medication or food (pharmacological and nonpharmacological)." (IR2-Public Health Center)

"More focused on guidelines and technical instructions in handling stunting for pharmacy based on the three competencies." (IR9-Public health center)

The development of pharmacist competencies can start from learning basic material, so an integrated digital learning platform is needed to support it.

"Starting with the basic material first, once that is done, perhaps a webinar or socialisation session can be held.....hopefully on the learning website all concepts of stunting services by pharmacists can be discussed, which can be used as a guide in the community by us as pharmacists." (IR6-Clinic)

The existence of legality and service standards as a uniform and valid official guide can be used by community pharmacists in providing independent services for stunting cases with confidence and professionally in pharmacies.

"Then there is the Standard Operating Procedure (SOP) for stunting.....if there is an SOP, then it is clear what our work is, the scope of our work, and its limitations." (IR7-Pharmacy)

"First, it must be related to the therapy; there has to be a guideline, as a reference for pharmacists when dealing with cases, let's say they come for self-medication, so what should we provide.....so indeed, pharmacists have very little learning about this issue, so there needs to be a learning medium that can comprehensively serve as a guideline or standard for pharmacists in providing stunting services." (IR8-Pharmacy)

The use of digital technology in supporting educational, interactive, and informative services for community pharmacists related to stunting-focused pharmacy services

Pharmacists need accessibility to information in order to have a clear and directed information pathway, in accordance with their professional roles and responsibilities. Ease of access to information media is not merely a learning tool, but becomes an important instrument to support pharmacists in providing stunting intervention services more effectively and efficiently.

"It is better to address it directly to the respective professionals in the field.....hopefully, this media can become a way for pharmacists to easily access information related to stunting services." (IR3-Clinic)

There is the same need among pharmacists in pharmacies and clinics for digital education facilities such as engaging interactive videos as a counseling aid suitable for the community, so that community pharmacists in pharmacies can ensure that stunting prevention messages are effectively delivered to the stunting target group.

"One of them is digital educational facilities for patients in the form of engaging videos that can be shared with patients... attention needs to be paid to language, which should not only be understood by healthcare professionals but also conveyed in terms that are easily understood by patients or the general public." (IR4-Pharmacy)

DISCUSSION

The findings of this study highlight the effectiveness of the role of community pharmacists in pharmaceutical services focused on stunting, which is hindered by a convergence of barriers in external, internal, and system factors. The role of community pharmacists is supported by public health priority issues in Indonesia, including stunting prevention, and requires coordination and integration involving various sectors and professions, including community pharmacists. (17). The professionalism of pharmacists in nutrition management worldwide is evaluated across education and consultation, nutrition assessment and advice, monitoring and evaluation, and interprofessional collaboration (3), thereby enabling general pharmaceutical services to be provided with sound knowledge, attitudes, and practices (18). Although global literature has generally provided positive responses regarding the readiness and future prospects of community pharmacists in delivering services and management related to nutrition (19–21). the implementation of pharmacy services focused on stunting in Indonesia still faces obstacles due to multifactorial issues

that are systemic, external, and internal. From a clinical perspective, the effectiveness of pharmacy services focused on stunting is closely related to the integration of a pharmacist's personal commitment, professional motivation, and specific competencies mastered (22). However, the dichotomy between public perception, the readiness of pharmacists in the field, and the level of community health literacy as well as socio-economic conditions often triggers skepticism toward the clinical role of community pharmacists (20). This challenge is then influenced by local societal norms and culture, as well as health-seeking behavior that have not positioned pharmacies as centers for nutritional education (23). Internal factor barriers are similar to the perceptions of community pharmacists in Nigeria regarding knowledge gaps in malnutrition management (5), another study found that pharmacists enjoy their role in community nutrition management but lack nutrition counseling skills, a significant barrier (24,25). Pharmacy education and integration into national preventive health initiatives need to be updated or continued through training (26). Researchers in Qatar found that community pharmacies can enhance counseling services by providing dedicated resources (27). The condition of these internal barriers is exacerbated by the presence of external barriers, namely related to the patient's financial capacity, such as affordability of prices, with medication costs becoming one of the significant barriers in the implementation of healthcare services (28,29). In addition, the level of education was also mentioned, but contrary to previous research which stated that mothers with low education levels are about twice as likely to have stunted children (30), and have a direct impact on stunting (31). Our study found that participants observed stunting also occurs in families with higher education levels, as well as denial regarding the stunted condition of their children. In terms of communication, barriers were found in practice approaches. Pharmacists very much need to learn communication techniques using standardized and common patient-centered methods; the use of simple, precise, and clear language can facilitate communication (32). The organizational structure of the health system in Indonesia has not structurally provided a specific 'legal framework' for pharmaceutical services focused on stunting, unlike in developed countries that have created room for solid collaboration between pharmacists and nutritionists and have been proven to improve patient outcomes (33). This situation is affected by the uneven distribution of pharmacists, with 80.19% in the western part of Indonesia and 19.81% in the eastern part. Therefore, there is a need for national policy transformation focused on improving healthcare workforce competence and implementing fair national-level policies to support the distribution and retention of pharmacists (34). Systemically, the main determinants are the absence of standard protocols for pharmaceutical services focused on stunting in community practice facilities and the weak integration of pharmacists in the stunting reduction acceleration team. Therefore, overcoming these obstacles requires policy reform that positions pharmacists as strategic partners in the implementation of stunting services. Broadly, the analysis revealed a high level of thematic convergence among the three community pharmacy practice facilities, indicating that barriers to stunting-focused pharmaceutical services are deeply rooted in the national pharmacy curriculum and pharmacist professional guidelines, regardless of the specific healthcare facility.

In response to the findings on the multifactorial barriers that have been presented, the findings in the second topic found an urgency in developing digital learning media related to pharmaceutical services with a comprehensive focus on stunting. The need for in-depth material on stunting and the availability of guidelines in field services reflects the hope of community pharmacists to contribute to the implementation of pharmaceutical services focused on stunting in Indonesia. This study found a positive relationship between support for community pharmacists' competency resources and their confidence as healthcare professionals in providing pharmacy services focused on stunting. Kelly et al, found that pharmacists are confident in their knowledge, skills, and attitudes regarding nutrition and are committed to future engagement (35). An intervention study by Douglas et al. found that pharmacists need to be more involved in nutrition education (36). This research indicates that community pharmacists require more competency materials on stunting communication, technical measurements, and nutritional status assessment, government stunting programs, educational media creation, and standardization of health promotion media. Pharmacy services focused on stunting require guidelines or standard operating procedures (SOPs) as well as pharmacist competency development to ensure safe pharmacy practice (37). A study in Jordan also encouraged the establishment of community pharmacy service guidelines (38). More deeply, the need for the development of digital learning media to improve the competence of community pharmacists in pharmaceutical services and stunting by combining and integrating various digital technologies into the pharmacy system simultaneously to enhance digital capabilities for pharmacists, marking a new era of pharmacy in support services and educational practice in pharmaceutical services focused on stunting. This study suggests that the Indonesian government provide structured

training programs for young pharmacists in practice (20,34), and that the use of technology enhances data sharing and collaboration among healthcare workers (39). Community pharmacists acknowledge the need for comprehensive and integrated introductory materials, but professional responsibilities limit community pharmacists' time to attend conventional face-to-face training. This study demonstrates a positive response to the use of digital media in the delivery of pharmacy services, aligning with research findings on the beneficial impact of technology use in pharmaceutical care (40,41), and a glimpse of future service paradigm trends toward digital transformation (39). Community pharmacists acknowledge patients' interest in digital assistance and support research on the readiness and support of pharmacists and patients for comprehensive tele-pharmacy services (42). In addition, support for the existence of continuous digital learning in pharmaceutical service education focused on stunting is mentioned. This supports research findings related to the positive effects of the nutritional interventions provided, but there is still a need for the continuous implementation of nutrition education interventions to maintain and enhance their nutrition education experiences (35,43).

This exploratory study states that the role of community pharmacists has not been specifically and systematically involved in the implementation of stunting programs in Indonesia, and resource support to strengthen the role of pharmacists will be a key determinant of the success of stunting programs in the future. The need for the use of technology in the development of digital learning media is not merely a technological trend, but an adaptive response to existing obstacles. This opens further exploration regarding the extent to which the development of digital learning media will enhance the competence of community pharmacists in pharmaceutical services targeted at stunting on a broader scale in the future.

Limitation of Study

The main limitation of this study is its reliance on self-reported data, making it vulnerable to social desirability bias. Respondents tend to report only professional behaviors that are considered socially acceptable. The use of structured interviews was intentionally chosen to ensure standardization and comparability of data from various community pharmacy practice backgrounds in Indonesia; the stability and standardization of the research data were ensured using the SOEI technique by peers to guarantee data consistency and depth of responses from nine community pharmacists from representative provinces. However, this study does not cover all provinces in Indonesia, and there is potential selection bias in certain regional categories related to pharmacist involvement. These results open opportunities for future quantitative research involving health stakeholders and beneficiaries (target groups for stunting).

CONCLUSIONS

This study shows that despite complex internal, external, and systemic barriers that have the potential to hinder the integration of community pharmacists in stunting programs, the need for the development of comprehensive digital learning media offers a promising pathway to bridge the clinical competence gap of community pharmacists. These findings illustrate how standardized digital resources can support the establishment of stunting-focused pharmaceutical service standards at the community level and provide an initial framework to strengthen the role of community pharmacists at each community pharmacy practice facility.

AUTHOR'S CONTRIBUTION STATEMENT

All authors carried out the conceptualisation of the research. FAP, APP, and SM performed data management. FAP, KA, PW, and SS conducted formal analysis and investigation. FAP, KA, PW, and SS developed the research methodology. FAP, SM, and APP managed project administration. KA, PW, and SS supervised. FAP and APP did data validation. All authors wrote and edited.

CONFLICTS OF INTEREST

The authors have no conflicts of interest to declare.

DECLARATION OF GENERATIVE AI AND AI-ASSISTED TECHNOLOGIES IN THE WRITING PROCESS

The authors state that the use of Artificial Intelligence (AI) technology to assist in writing, language editing, and grammar checking does not affect the scientific substance, data interpretation, or conclusions of this research. All content and academic responsibility in this manuscript are entirely the responsibility of the authors.

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