

ISSN 2354-8428
e-ISSN 2598-8727

JURNAL KEPERAWATAN

KOMPREHENSIF

COMPREHENSIVE NURSING JOURNAL

Published by :

**Sekolah Tinggi Ilmu Keperawatan
PPNI Jawa Barat**

Vol. 9 No. 2, April 2023



JURNAL KEPERAWATAN KOMPREHENSIF	VOL. 9	NO. 2	Bandung April 2023	ISSN 2354-8428	e-ISSN 2598-8727
------------------------------------	--------	-------	--------------------------	-------------------	---------------------



Review Article

Challenges on Standardized Diabetes Mellitus Care Implementation in the Primary Health Care in Indonesia: A Narrative Review

Arnita Sofianingrum^{1*} | Sutopo Patria Jati² | Martini Martini³

^{1,2,3}Department of Public Health,
Faculty of Public Health
Universitas Diponegoro,
Semarang, Indonesia

*contact

arnitasofianingrum01@gmail.com

Received : 18/04/2023

Revised : 29/04/2023

Accepted : 29/04/2023

Online : 30/04/2023

Published : 30/04/2023

Abstract

Aims: The prevalence of diabetes mellitus remains high worldwide and has long-term health implications and impacts on the quality of life of those affected. As a catastrophic disease, diabetes mellitus has the potential to burden national healthcare financing, including in Indonesia. Improving standardized diabetes mellitus services, starting from primary healthcare facilities, is a critical effort that is hoped to address this potential burden. The aim of this study is to synthesize and obtain information on the challenges of implementing minimum standards for diabetes mellitus services in Indonesia.

Method: This study is a narrative literature review using the PRISMA framework. In this review, inclusion and exclusion criteria to gather articles from Pubmed, ScienceDirect, Google Scholar, ProQuest, and Emerald. The MMAT instrument was used to select eligible articles in study.

Results: Our findings indicate that 19 eligible journal articles related to the challenges of implementing minimum standards for diabetes mellitus services in Indonesia. The synthesis results showed that there are challenges in implementing minimum standards for diabetes mellitus services in Indonesia, particularly in the internal and external aspects of patients, primary healthcare facilities, and the government.

Conclusions: The challenges of implementing minimum standards for diabetes mellitus services in Indonesia need to be addressed through enhancing the interpersonal and practical skills of healthcare providers, strengthening the role of primary healthcare facilities and the government, ensuring adequate funding support, and establishing appropriate indicators that reflect the field's conditions as a reference for achieving the implementation of minimum standards for diabetes mellitus services in Indonesia.


Keywords:

Standardized minimum care of diabetes mellitus; diabetes mellitus; Primary Health Care

INTRODUCTION

Diabetes Mellitus (DM) is a major non-communicable disease (NCD) that is widely prevalent worldwide. Global data from 2017 showed that diabetes is responsible for 1.4 million deaths worldwide, or 2.5% of

all fatalities (1). In Indonesia, the prevalence of diabetes mellitus has increased by 0.5% compared to previous years, reaching 2% (2). A chronic metabolic condition called diabetes mellitus is characterized by a rise in the level of blood sugar along with a fall in insulin secretion

 <https://doi.org/10.33755/jkk>

This is an open access article under the [CC BY-SA](https://creativecommons.org/licenses/by-sa/4.0/) license



and/or insulin resistance in the body. This disease is chronic and cumulative, and therefore often occurs in older age. Diabetes is also a catastrophic disease that can cause complications in the heart, kidneys, and reduce the quality of life of patients (1).

According to data from the Social Security Administering Body for Health (BPJS Kesehatan), catastrophic illness accounted for 25 to 31 percent of the total cost of health insurance in 2020. BPJS Kesehatan spent IDR 20 trillion in 2020 to cover catastrophic disease treatments and medications, including Diabetes Mellitus (3). The escalating burden of catastrophic disease expenses on national health insurance poses a threat to the national healthcare system. Due to the potential for complications, this disease also presents a number of challenges, from prevention and primary care to referral and rehabilitative care (4–6).

The government seeks to improve the quality of diabetes mellitus care by instituting minimum service standards through Minister of Health Regulation No. 43 of 2016. Comprehensive application of standardized diabetes mellitus care from primary care to advanced care. Improving primary care is one of the pillars of efforts for avoiding maintaining diabetes mellitus in order to prevent additional increases. This standardized service aims to improve the expected outcomes of diabetes mellitus care, prevent complications and mortality, and enhance diabetes mellitus patients' quality of life (7).

In the minimal service standard for diabetes mellitus at primary care facilities (Puskesmas), there are four main pillars, namely education, physical activity, nutritional therapy, and pharmacological therapy (7). In practice, standardized diabetes mellitus care still encounters obstacles; therefore, it is necessary to identify the obstacles that must be overcome in order to implement the minimal service standards for diabetes mellitus. However, due to Indonesia's

immense geographical factors, the evaluation of diabetes mellitus treatment barriers is fragmented in certain areas and does not completely describe the efforts of diabetes mellitus care that refer to the four pillars of minimal service standards. Consequently, examining previous studies is an effective and efficient method for identifying obstacles to standardizing diabetes care in Indonesian primary health care facilities.

METHODS

Design

This study was a narrative literature review that aimed to synthesize information from previous research articles. Secondary data in the form of research articles published in journal databases were selected and examined carefully using specific methods and tools to produce high-quality results. In the process of selecting journal articles, we referred to the PRISMA framework (8), which has been commonly used in various literature review studies. The obtained articles were then analyzed and categorized according to the purpose of the research, which was to identify challenges in implementing standardized care for diabetes mellitus in Indonesia.

Inclusion and Exclusion Criteria

We also used several criteria restrictions to increase the accuracy of the selected articles, which were journal articles published from 2019 to 2023, with the research conducted in healthcare facilities in Indonesia, focusing on primary healthcare facilities, using English or Indonesian language, and only focusing on adult diabetes mellitus patients. We excluded articles that did not meet the exclusion criteria, which received an MMAT score of <80 and all literature review studies.

Data Extraction

In this study, the researchers conducted a search for health journal articles related to standardized care or treatment of diabetes

mellitus in journal databases such as Pubmed, ScienceDirect, Google Scholar, ProQuest, and Emerald. We used the SPIDER method to formulate research

questions and identify keywords that we used to search for articles in journal databases. The keyword sequence used was as follows:

Table 1. Keywords for Literature Searching

Databases	Keywords
Pubmed	((("diabetes mellitus"[MeSH Terms] OR ("diabetes"[All Fields] AND "mellitus"[All Fields]) OR "diabetes mellitus"[All Fields]) AND "care"[All Fields] AND ("primary health care"[MeSH Terms] OR ("primary"[All Fields] AND "health"[All Fields] AND "care"[All Fields]) OR "primary health care"[All Fields]) AND ("challenge"[All Fields] OR "challenged"[All Fields] OR "challenges"[All Fields] OR "challenging"[All Fields]) AND ("indonesia"[MeSH Terms] OR "indonesia"[All Fields] OR "indonesia"[All Fields] OR "indonesia"[All Fields])) AND (2019:2023[pdat])
ScienceDirect	diabetes mellitus care AND Primary Health Care AND challenge AND "indonesia" AND Indonesia
ProQuest	(diabetes mellitus care) AND (Primary Health Care) AND challenge AND "indonesia" AND Indonesia
Google Scholar	health care provider OR nurse OR doctor AND primary healthcare center MUST "diabetes mellitus" AND Standardized Diabetes mellitus care OR diabetes mellitus care OR standardized diabetes mellitus quality care OR clinical practice AND "challenge" AND "indonesia"
Emerald	diabetes care AND (primary healthcare center) AND (challenge) AND (indonesia)

Instrument

To ensure the quality of the selected articles, the researchers used the mixed method appraisal tool (MMAT), which can be used for a wide range of studies, including quantitative, qualitative, and mixed-method research. MMAT uses a threshold value of 80 to determine whether the selected articles are of high quality or not (9,10). In addition, this study also used software tools such as rayyan.ai to help sort the extracted data according to the research needs.

RESULTS AND DISCUSSIONS

The search for journals resulted in 2,762 articles. All of the results were then sorted and checked for eligibility to obtain the best articles to be synthesized. The following is the process of article selection based on the PRISMA framework:

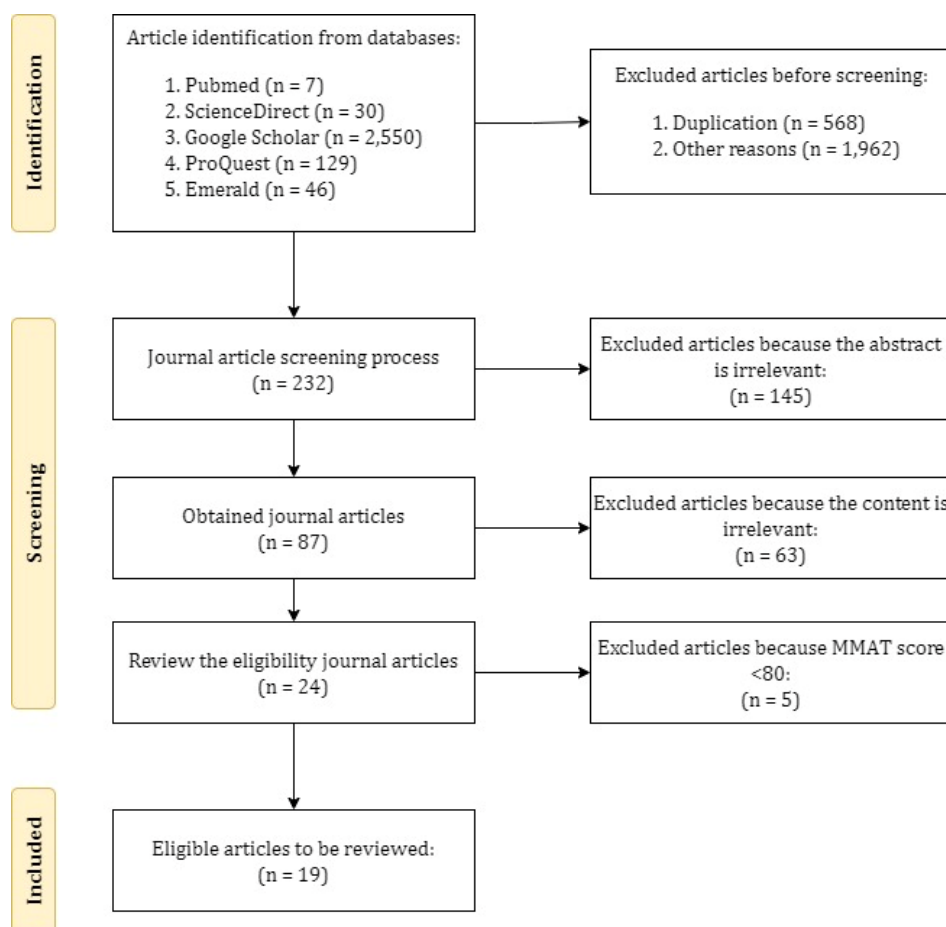


Figure 1. PRISMA framework for Literature Screening

From the review results, it was found that the majority of articles were quantitative research (57.89%). Qualitative research accounted for 36.84% and the rest were mixed-method research (5.26%).

Table 2. List of Eligible Article for Review Process

Authors	Year of Published	Study Design	MMAT Score	Results
Sofyan <i>et al.</i>	2023	Mixed-Method	80	The majority of DM patients were women (n=426). Some DM patients experienced complications (such as retinopathy 31.7%, nerve problems 20.2%, etc.). Both men and women experienced high levels of distress (>72%) and low physical activity levels (>58%). The challenges faced by the elderly health program (Prolanis) were difficulty in reaching and maintaining patients.
Budiastutik <i>et al.</i>	2023	Quantitative	80	The majority of patients in the study were women (80.5%) and over 40

Authors	Year of Published	Study Design	MMAT Score	Results
				years old (90.7%), with low participation in diabetes prevention education (61.0%). The prevalence of prediabetes cases was high (76.4%). The ownership of BPJS Kesehatan had an OR of 5.95, a history of hypertension had an OR of 3.25, and hypertension had an OR of 2.14 for the incidence of further DM.
Wahidin <i>et al.</i>	2023	Quantitative	80	There is a difference in the achievement of standardized minimum care between remote, border, and island areas (DTPK) and non-DPTK (0.000), as well as between eastern and western regions of Indonesia (0.0009). The achievement of standardized minimum care for DM is quite high, and there are differences between districts/cities, DTPK, and regions. There is also no correlation between physical and non-physical funds with standardized minimum care for DM.
Puri <i>et al.</i>	2022	Quantitative	80	The majority of the DM patients in the study were women (76.5%). Most patients received DM nutrition education for less than 30 minutes (60.3%), every 1-2 months (59.8%), and from a doctor (57.5%). Patients expressed satisfaction with the nutrition education service (73.2%) and indicated a need for nutrition education (88%), but required a booklet (20.4%). The perceived benefits included an increase in knowledge (51.9%), improvement in quality of life (27.9%), reduction in blood glucose levels (10.0%), and reduction in body weight (1.1%). Patients who did not receive routine nutrition education cited reasons such as not being recommended by a doctor (42.3%) and lack of interest (33.3%).
Marwati, Kusmayanti and Rosyidah	2022	Quantitative	100	The majority of DM patients were women (54%) and over 44 years of age (72%). Patients mostly require medication to control their blood

Authors	Year of Published	Study Design	MMAT Score	Results
				glucose levels (29%). In terms of their psychological condition, patients are most impacted in the social aspect of DM, particularly in sexuality, but are generally satisfied with the primary healthcare services. Most patients experience exposure-related disruptions, such as pollution, noise, weather, and others.
Pamungkas <i>et al.</i>	2022	Qualitative	100	<p>There are obstacles in conducting neuropathy assessment in DM patients:</p> <ol style="list-style-type: none"> 1) Lack of knowledge and skills in screening peripheral neuropathy by healthcare providers, lack of tools and facilities at health centers for neuropathy screening, high workload of health centers, lack of human resources, and difficulty in reaching patient understanding. 2) These factors lead to lost follow-up of patients and an increased incidence of peripheral neuropathy in DM patients.
Widayanti <i>et al.</i> ,	2021	Qualitative	80	<p>There are several variables that affect the ability of patients with DM to have good and healthy eating habits:</p> <ol style="list-style-type: none"> 1) Changing meal schedules. 2) Medication characteristics, access to health centers (difficult to reach health centers due to busy schedules or distance from residence), experience of side effects, and social burden (cultural activities: traditional events).
Puri <i>et al.</i>	2021	Quantitative	100	The majority of the respondents were women (95.8%). The frequency of receiving nutrition education at the primary health care center was only once a month (41.7%), and less than 10 patients (68.7%). Nutrition education for patients with diabetes mellitus has been shown to improve knowledge, attitude, behavior, and patient outcomes.

Authors	Year of Published	Study Design	MMAT Score	Results
Presley and Groot	2021	Quantitative	80	The provision of education about DM treatment is more extensive and effective if it is done directly. Some factors that affect patients' perceptions of DM drug education in health centers include age, being female, marital status, educational status, employment status, household expenses, and income.
Rahmadani, Surjoputro and Budiyaniti	2021	Qualitative	80	The obstacles that arise are in the stage of data collection for DM patients as it is still combined with the PIS-PK survey data collection, resulting in a lack of specific resources for DM patient data collection. Additionally, at the early detection stage for DM patients, there are obstacles in fulfilling the necessary infrastructure and funding, which results in suboptimal detection of DM cases and failure to meet the SPM target. Some of the staff complained about burdens of carrying out their duties besides to do standardized minimum care.
Asril <i>et al.</i>	2020	Quantitative	100	The majority of respondents in the study were men (56.7%) and had complications (>50%). Education had an impact on the choice of diet, daily routine activities, physical activity, mental and social balance, and healthy lifestyle behaviors. Family support was found to be important in improving the behavior change of DM patients. Knowledge about DM also had an impact on the behavior change of patients.
Husnayain, Ekadinata and Sulistiawan	2020	Quantitative	100	The incidence of DM and cardiovascular complications is equally high in both men and women, and many are examined at primary healthcare facilities. Patients often have to spend personal funds for treatment.
Aliyah	2020	Quantitative	80	The achievement of DM SPM in Bandung city is 115.35%, but its distribution is still uneven among each region. The DM service SPM

Authors	Year of Published	Study Design	MMAT Score	Results
				continues to increase every month in 2020, indicating an increasing achievement of DM SPM. The high achievement of DM in Bandung can be seen from two perspectives. Firstly, there is a possibility that the DM target population is small, and there are actually more DM patients than what has been targeted. Secondly, there is an indication that the recording and reporting of patients by name and address has not been implemented properly, thus there is a possibility of double registration. The obstacles that arise are related to facilities and infrastructure, such as the absence of PTM Kit Posbindu due to limited budget, and not all UPT Puskesmas have trained personnel to provide services.
Rachmawati <i>et al.</i>	2019	Quantitative	100	The majority of patients were women (67.9%). There was a significant relationship between diabetes literacy and self-care of diabetes ($p=0.011$) with an odds ratio of 0.43. Age was also found to have an impact on the diabetes literacy ability of patients (median 64 years).
Pamungkas, Chamroonsawasdi and Vatanasomboon	2019	Qualitative	100	Barriers to patient self-management: 1) low perception of disease severity, 2) lack of knowledge and skills in patient self-management, 3) lack of motivation, 4) insufficient healthcare professionals to facilitate self-management, 5) feeling of shame and social isolation.
Cholil <i>et al.</i>	2019	Quantitative	100	There are still high complications in patients with DM, especially in the eyes, cardiovascular, renal, feet, and erectile ability that affect patient's quality of life (QoL). Compliance with diet is still not optimal (>69%), as well as physical activity (>79%). Patients still experience mild hypoglycemia at 23.8%, rarely check blood glucose at 43.7%, and experience quite high psychological disturbances.

Authors	Year of Published	Study Design	MMAT Score	Results
Suhbah, Suryawati and Kusumastuti	2019	Qualitative	80	The empowerment of Posbindu as a means of screening for NCDs, including DM, is still hindered by issues related to standard operating procedures, organization, facilities and infrastructure, as well as funding. This indicates that the implementation of standardized minimum care at the community level still has shortcomings.
Kurniawati, Suryawati and Arso	2019	Qualitative	80	Not all diabetes mellitus control program implementers receive formal training. The funds for diabetes mellitus screening implementation are still insufficient, so village funds are needed. The facilities and infrastructure to support the implementation of the diabetes mellitus control program in the health center still face constraints, especially in the limited availability of blood sugar test strips. As a result, not all target communities can be screened. The achievement of the diabetes mellitus patient health service program according to standards in the healthcare center in 2018 was quite low, where until the third semester of 2018, it was only able to reach 4.4%.
Habibullah, Mutiarin and Sarofah	2019	Quantitative	100	The provision of healthcare services for patients with comorbid hypertension and diabetes mellitus includes health promotion, disease prevention, diagnosis, and treatment. However, the long-term care for these patients is still low.

Our analysis indicates that there are several challenges in providing quality and standardized care for patients with diabetes mellitus in primary healthcare facilities. The following are the results of the article synthesis in this study:

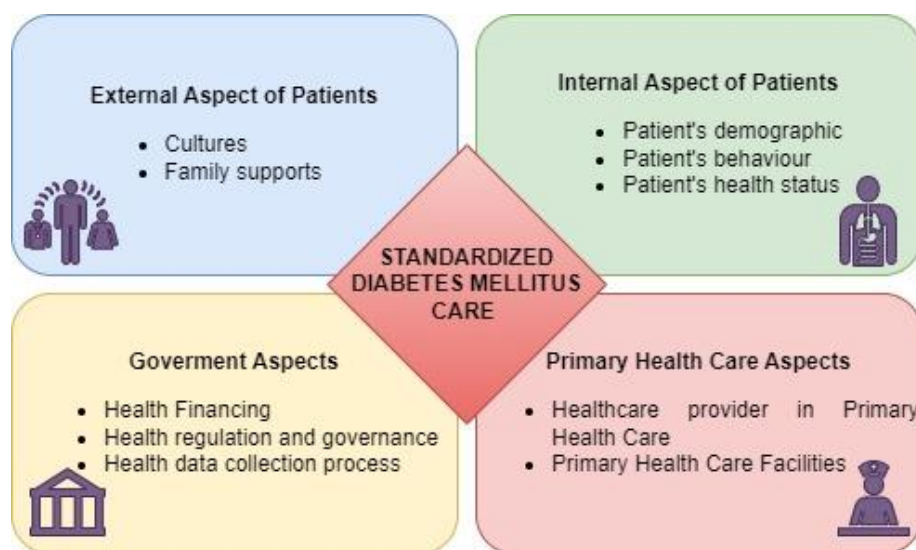


Figure 2. Illustration of the Challenges of Standardized Minimum Care Implementation for Diabetes Mellitus Patients in Indonesia

Internal Aspects of Patients

The internal aspects of patients are related to their demographic characteristics, behavior, and health status. Several studies have shown that female respondents dominate the research population. The results of these studies indicate that women have better compliance rates than male diabetes mellitus patients (11–14). In a study conducted to identify the health behaviors of diabetes mellitus patients, it was found that the majority of respondents were men. Some factors contributed to the less adaptive health behavior towards diabetes treatment provided by healthcare workers at Puskesmas, such as appropriate diet choices, daily routines, physical activity, mental and social balance, and healthy lifestyle behavior (15,16).

One of the most commonly found health behaviors in reviews is the lack of self-management of diabetes care planned by healthcare workers at Puskesmas and the low access to diabetes mellitus services provided by Puskesmas (17,18). On the other hand, although standard diabetes care has been provided, some diabetes mellitus patients also experience several other complications due to diabetes (>50%), resulting in various access to

healthcare services provided by Puskesmas. The more complex the patient's condition, the more likely they are to choose to access healthcare services at higher-level healthcare facilities (12,13,19).

External Aspects of Patients

The cultural environment of diabetes mellitus patients' residence also poses a challenge that healthcare workers must face in providing diabetes mellitus services to patients. Due to Indonesia's cultural diversity, several areas, particularly in rural areas, still believe in supernatural healing processes for a disease. For example, in Bali society, people's trust in traditional healers' treatment is also applied to diabetes mellitus patients' self-care. This belief sometimes causes diabetes mellitus patients' access to the care provided by Puskesmas to be low or the care that has referred to the 4 minimal diabetes mellitus service pillars to be disrupted due to interactions with traditional herbs (15).

In other communities, such as communal cultures for traditional events, diabetes mellitus patients forget to take their prescribed medication. Therefore, diabetes mellitus patients' compliance decreases and is not in line with the treatment plan (20).

Educating and empowering the patient's family as medication supervisors is essential to support the achievement of the 4 minimal diabetes mellitus service pillars, including education, physical activity, good nutrition, and regular pharmacological therapy (15).

Primary Healthcare Facility Aspects

In many studies, adequate support for infrastructure and competent human resources is essential to achieving quality and standard diabetes mellitus services. Sufficiency of healthcare workers in standard diabetes mellitus care is essential. Not only is it sufficient, but healthcare workers who provide health services must also have the necessary skills. In a study conducted by Kurniawati, Suryawati, and Arso, not all healthcare workers providing minimal diabetes mellitus services have received training. Skills in providing education, screening, referrals, treatment, monitoring, and evaluation are necessary in minimal diabetes mellitus service activities. The still low ability of healthcare workers to provide standard diabetes mellitus care due to lack of training risks making the achievement of SPM (minimum health service standards) not optimal (21–23).

The integration of various multidisciplinary approaches in providing standardized diabetes services is the core of healthcare service in the dimension of healthcare professionals (11,16,24,25). The burden of diabetes services is not only on doctors but also requires support from nurses in promoting and preventing activities in POSBINDU (Pos Pembinaan Terpadu), nutrition experts in providing education about the necessary nutrition for patients, and pharmacists related to providing appropriate information about diabetes medication consumption given to patients (23,26).

Support from facilities and infrastructure for education, screening, nutrition therapy, and pharmacology for diabetes patients is also important. In screening diabetes cases, a lack of blood glucose detection equipment

will cause low screening coverage. Adequate educational materials are also needed for diabetes patients. For example, in a study by Puri et al., patients felt that education would be more effective if provided in the form of a booklet (11,25). Education for diabetes patients has a significant impact as it will improve knowledge, attitudes, behaviors, and self-awareness towards the disease and treatment regimen (12).

Puskesmas as a provider of promotive and preventive services is the appropriate system for building closer relationships with patients to improve their understanding and ability to manage diabetes care that has been given.

Government Aspects

Government support as policymakers is the key to the success of minimal diabetes service standards in Indonesia. Clear regulations governing minimum service standards will serve as a guide for primary health facilities in providing standardized diabetes services. However, there are still obstacles in its implementation, such as funding schemes that are not appropriate, unstructured organization, and data collection as indicators of achieving minimum service standards in Puskesmas that are not appropriate (4).

Healthcare financing for patients is covered by BPJS Kesehatan (27), but in practice, standardized diabetes services require more funding support. In one study, it was mentioned that funding for diabetes screening is still insufficient, so assistance from village funds is needed. However, the use of village funds for the purchase of blood glucose sticks is considered inappropriate. Other challenges that arise are related to inadequate facilities and infrastructure, such as in POSBINDU for non-communicable diseases services due to limited funds. The need for standard operational procedures that are in line with Government guidelines is needed by healthcare workers and primary health facilities in the implementation of minimum

service standards for diabetes care (21).

The uneven distribution of financing for diabetes services is also evident in the allocation of funds by the government. For example, primary health facilities in rural areas and in the Eastern part of Indonesia receive lower diabetes service funds than primary health facilities in urban areas and the Western part of Indonesia. These macro challenges need to be addressed by the government so that the achievement of minimum diabetes service standards can be improved even in the areas that really need it (28).

The achievement of minimum service standard indicators for diabetes care in one study shows an uneven distribution between one Puskesmas working area and another. Although the cumulative achievement of minimum diabetes service standards showed results above the target, this may mean miscalculations between target population data and the population data served (23,28). In one study, the target population for achieving minimum diabetes service standards refers to data from the Central Statistics Agency (BPS), but the data obtained by health workers at Puskesmas are the results of the PIS-PK survey they conducted in the field. Thus, sometimes the number obtained has a difference (22,29).

CONCLUSION

According to the findings of this study, there are still obstacles in achieving the minimal service standards for diabetes mellitus care. Four aspects were identified as the main challenges: patient internal factors, patient external factors, primary healthcare facility factors, and government factors. To achieve the maximum implementation of diabetes mellitus minimum service standards, healthcare workers need to understand the appropriate approach to providing care to patients, taking into account patient characteristics and cultural background. In delivering standardized healthcare services based on the four pillars of diabetes mellitus minimum service standards,

healthcare workers also need to have proficient practical and interpersonal skills. The primary healthcare facilities and government have a responsibility to provide funding and capacity-building training programs for healthcare workers in providing diabetes mellitus minimum service standards. The role of the government is crucial in ensuring the implementation of the minimum service standards by providing guidance, improving control, monitoring, and evaluation of the implementation and funding of the program. The accuracy between the survey data and achievement indicators must be ensured by the government to avoid miscalculation.

REFERENCES

1. PAHO/WHO. Burden of Diabetes Mellitus [Internet]. 2021 [cited 2023 Apr 16]. Available from: [https://www.paho.org/en/enlace/burden-diabetes-mellitus#:~:text=In 2019%2C regionwide diabetes mellitus,20.9 deaths per 100%2C000 population](https://www.paho.org/en/enlace/burden-diabetes-mellitus#:~:text=In%2019%2C%20regionwide%20diabetes%20mellitus,20.9%20deaths%20per%20100%20population).
2. Balitbangkes RI. Laporan Riskesdas 2018 Nasional.pdf. Lembaga Penerbit Balitbangkes. Jakarta: Kementerian Kesehatan RI; 2019.
3. BPJS. Tekan Kasus Diabetes, Promotif Preventif FKTP Perlu Diperkuat. 2021 Nov 14; Available from: <https://www.bobobox.co.id/blog/siaran-pers-bobobox/>
4. Peiris D, Sharma M, Praveen D, Bitton A, Bresick G, Coffman M, et al. Strengthening primary health care in the COVID-19 era: a review of best practices to inform health system responses in low- and middle-income countries. *WHO South-East Asia J Public Heal.* 2021;10(3):6.
5. Ni Y, Liu S, Li J, Li S, Dong T. Patient-perceived service needs and health care utilization in people with type 2 diabetes: A multicenter cross-sectional study. *Medicine (Baltimore).*

- 2020 May;99(21):e20322.
6. Patty YFPP, Mufarrihah, Nita Y. Cost of illness of diabetes mellitus in Indonesia: a systematic review. 2021;32(4):285–95. Available from: <https://doi.org/10.1515/jbcpp-2020-0502>
 7. Kemenkes RI. Peraturan Menteri Kesehatan Republik Indonesia Nomor 43 Tahun 2016. Indonesia; 2016.
 8. Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 Statement: An Updated Guideline for Reporting Systematic Reviews. *BMJ*. 2021;372(n71).
 9. Hong QN, Fàbregues S, Bartlett G, Boardman F, Cargo M, Dagenais P, et al. The Mixed Methods Appraisal Tool (MMAT) Version 2018 for Information Professionals and Researchers. *Educ Inf*. 2018;34(4):285–91.
 10. Hong QN, Pluye P, Fàbregues S, Bartlett G, Boardman F, Cargo M, et al. Mixed Methods Appraisal Tool (MMAT) Version 2018: User Guide. McGill [Internet]. 2018;1–11. Available from: http://mixedmethodsappraisaltoolpublic.pbworks.com/w/file/attach/127916259/MMAT_2018_criteria-manual_2018-08-01_ENG.pdf
 11. Puri IY, Yusof BM, Zaid ZA, Ismail A, Haron H, Lipoeto NI. The Individual Nutrition Education Needs among Patients with Type 2 Diabetes at the Public Health Centers in Padang , Indonesia : A Cross-Sectional Study. *Nutrients*. 2022;14(1105):1–11.
 12. Marwati TA, Kusmayanti NA, Rosyidah R. Quality of Life Among Diabetes Mellitus Patients in Indonesian Chronic Disease Management Program (Prolanis). *Epidemiol Soc Heal Rev*. 2022;4(2):76–86.
 13. Sofyan H, Diba F, Susanti SS, Marthoenis M, Ichsan I, Sasmita NR. The state of diabetes care and obstacles to better care in Aceh, Indonesia : a mixed - methods study. *BMC Health Serv Res [Internet]*. 2023;23(271):1–7. Available from: <https://doi.org/10.1186/s12913-023-09288-9>
 14. Rachmawati U, Sahar J, Nurviyandari D, Wati K. The association of diabetes literacy with self-management among older people with type 2 diabetes mellitus : a cross-sectional study. *BMC Nurs*. 2019;18(Suppl 1):1–8.
 15. Asril NM, Tabuchi K, Tsunematsu M, Kobayashi T, Kakehashi M. Predicting Healthy Lifestyle Behaviours Among Patients With Type 2 Diabetes in Rural Bali, Indonesia. *2 Clin Med Insights Endocrinol Diabetes*. 2020;13.
 16. Puri IY, Yusof B-NM, Zaid ZA, Ismail A, Haron H, Lipoeto NI. Currents Nutritional Practices of Nutritionists in the Management of Type 2 Diabetes Patients at Public Health Centres in Padang, Indonesia. *Nutrients*. 2021;13(1975):1–10.
 17. Pamungkas RA, Chamroonsawasdi K, Vatanasomboon P. Barriers to Effective Diabetes Mellitus Self-Management (DMSM) Practice for Glycemic Uncontrolled Type 2 Diabetes Mellitus (T2DM): A Socio Cultural Context of Indonesian Communities in West Sulawesi. *Investig Heal Psychol Educ*. 2019;250–61.
 18. Cholil AR, Lindarto D, Gde T, Pemayun D, Wisnu W, Kumala P, et al. DiabCare Asia 2012 : diabetes management, control, and complications in patients with type 2 diabetes in Indonesia. *Med J Indones*. 2019;18(1):47–56.
 19. Arsyad DS, Hamsyah EF, Qalby N, Qanitha A, Westerink J, Cramer MJ, et al. The readiness of public primary health care (PUSKESMAS) for

- cardiovascular services in Makasar city, Indonesia. *BMC Health Serv Res* [Internet]. 2022;22(1112):1–12. Available from: <https://doi.org/10.1186/s12913-022-08499-w>
20. Widayanti AW, Sigalingging KK, Dewi FP, Widyakusuma NN. Issues Affecting Medication-Taking Behavior of People with Type 2 Diabetes in Indonesia: A Qualitative Study. *Patient Prefer Adherence*. 2021;15:989–98.
 21. Kurniawati N, Suryawati C, Arso PS. Evaluasi program pengendalian diabetes mellitus pada usia Produktif di Puskesmas Sapuran tahun 2019. *J Kesehatan Masy* [Internet]. 2019;7(4):633–46. Available from: <http://ejournal3.undip.ac.id/index.php/jkm>
 22. Rahmadani AN, Surjoputro A, Budiyanti RT. Implementasi Kebijakan Standar Pelayanan Minimal Penderita Diabetes Mellitus Di Puskesmas Pandanaran Kota Semarang. *J Kesehatan Masy*. 2021;9(2):149–56.
 23. Aliyah YA nurul. Capaian Standar Pelayanan Minimal (SPM) Bidang Kesehatan Kasus Hipertensi dan Diabetes Mellitus di Kota Bandung Tahun 2020. *J Ilmu Pemerintah Widya Praja*. 2020;46(2):355–68.
 24. Pamungkas RA, Usman AM, Chamroonsawasdi K, Khoirunisa D, Hamzah AN, Hidayat R. Challenge of Neuropathy Screening for Diabetic Foot Ulcers: Perspective of Public Health Nurses in Indonesia. In: *The International Virtual Conference on Nursing*. 2022. p. 46–58.
 25. Presley B, Groot W. Pharmacists ' and patients ' perceptions about the importance of pharmacist services types to improve medication adherence among patients with diabetes in Indonesia. *BMC Health Serv Res*. 2021;21(1227):1–15.
 26. Murthy N, Chandrasekharan S, Prakash MP, Ganju A, Peter J, Kaonga N, et al. Effects of an mHealth Voice Message Service (mMitra) on Maternal Health Knowledge and Practices of Low-Income Women in India: Findings from a Pseudo-Randomized Controlled Trial. *BMC Public Health*. 2020;20(820):1–11.
 27. Budiastutik I, Kartasurya MI, Subagio HW, Widjanarko B. High Prevalence of Prediabetes and Associated Risk Factors in Urban Areas of Pontianak , Indonesia : A Cross-Sectional Study. *J Obes*. 2022;2022.
 28. Wahidin M, Latelay AM, Nitami M, Unggul E, Ahli P, Indonesia E. Dana Alokasi Khusus dan Capaian Standar pelayanan Minimal Diabetes Melitus di Indonesia. *Indones J Nurs Heal Sci*. 2023;8(1):84–90.
 29. Husnayain A, Ekadinata N, Sulistiawan D. Multimorbidity Patterns of Chronic Diseases among Indonesians : Insights from Indonesian National Health Insurance (INHI) Sample Data. *Environ Res Public Heal*. 2020;17(8900):1–12.