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Training for Posbindu Cadres on Digital Recording of Blood Glucose Test Results for Public Health Monitoring

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Abstract

Integrated Development Posts for Non-Communicable Diseases (Posbindu PTM) play an important role in the early detection of diabetes mellitus through blood glucose testing. However, manual recording of results is often incomplete, difficult to summarize, and does not allow monitoring of each resident's trend. This community service activity aimed to improve Posbindu cadres' knowledge and skills in digitally recording blood glucose results. The activity was held on 3 February 2026 at Posbindu Sayang Ibu, in the working area of Puskesmas Nagaswidak, Palembang, and involved 20 cadres. The training covered blood glucose interpretation and recording principles, hands-on use of a digital form (Google Form) linked to a spreadsheet (Google Sheets), a simulation of recording 10 sample records, and mentoring during Posbindu services. Cadres' knowledge increased from 49.5 ± 22.8 to 82.0 ± 17.0 ($p < 0.001$), with a mean N-gain of 0.64 (moderate). Compared with manual recording, digital recording increased data completeness from 80.0% to 96.1%, data accuracy from 84.9% to 97.0%, and correct classification of blood glucose results from 63.0% to 92.6% (all $p < 0.001$), and shortened recording time from 2.7 to 1.4 minutes per resident. The system usability score reached 76.9 (good). During mentoring, cadres recorded results for 32 residents, and 3 residents (9.4%) with random blood glucose ≥200 mg/dL were referred to the health center. Digital recording training effectively improves cadres' knowledge and skills and the quality of Posbindu data.

Keywords: *blood glucose; digital recording; health cadres; non-communicable diseases; Posbindu*

INTRODUCTION

Diabetes mellitus (DM) is one of the non-communicable diseases (NCDs) that imposes the greatest burden in Indonesia. The 2023 Indonesian Health Survey (SKI) indicates that 11.7% of

the population has blood sugar levels above the normal range based on blood tests, while the proportion of individuals who have been formally diagnosed by a physician is significantly lower (Health Development Policy Agency, 2023). This suggests that many people living with DM are unaware of their condition. Early detection through blood glucose screening among at-risk groups, combined with regular monitoring of results, is a crucial step in the prevention and control of DM (PERKENI, 2021).

An Integrated Non-Communicable Disease (NCD) Monitoring Post (*Pos Pembinaan Terpadu PTM* or *Posbindu PTM*) serves as a platform for community participation in the early detection and monitoring of NCD risk factors—including blood glucose testing—and is managed by community volunteers (*kader*). To be effective, test results must be recorded completely and accurately; this allows for the tracking of individual health trends and ensures that individuals with high-risk readings can be promptly referred for further care. However, in many *Posbindu* locations, recording is still performed manually using logbooks or cards, which frequently leads to incomplete data, illegible handwriting, duplicate entries, and time-consuming data compilation. Various community service initiatives have demonstrated that simple digital forms, such as Google Forms, can assist volunteers in recording and reporting data more easily and efficiently (Junaidi et al., 2021; Marini et al., 2023; Alfiarini & Apriadi, 2024).

The "Sayang Ibu" Posbindu (Integrated Health Post) is located in Gang Bersama, RT 14 RW 04, 11 Ulu Village, Seberang Ulu II District, Palembang City, and falls under the working area of the Nagaswidak Community Health Center (Puskesmas). Initial observations revealed that blood glucose test results are recorded manually in a register book. Certain fields—such as date of birth, time of last meal, and result category—are frequently left blank; retrieving past test results is difficult; and the process of compiling monthly reports for the community health center is time-consuming. Although most health volunteers (kader) own smartphones, they have not received training on how to use them for record-keeping. Consequently, a team from the Bachelor of Applied Science (D4) program in Medical Laboratory Technology and the Master's program in Public Health at Universitas Kader Bangsa conducted training for these volunteers on the digital recording of blood glucose test results. This initiative aims to: (1) enhance the volunteers' knowledge regarding blood glucose interpretation and the principles of proper record-keeping;

(2) improve their skills in digital data entry; and (3) increase the completeness and accuracy of Posbindu data for public health monitoring.

EXECUTION METHOD

Time, location, and target participants. The activity took place on Tuesday, February 3, 2026, at the "Sayang Ibu" Posbindu (Integrated Non-Communicable Disease Post) located on Gang Bersama, RT 14 RW 04, 11 Ulu Village, Seberang Ulu II District, Palembang City—an area served by the Nagaswidak Community Health Center (Puskesmas). The target participants were volunteers ("kaders") from the "Sayang Ibu" Posbindu and other Posbindu units within the Nagaswidak Community Health Center's service area who own smartphones. A total of 20 volunteers participated in the entire program.

Implementation team and partners. The activities were carried out by faculty members from the Bachelor of Applied Science (D4) program in Medical Laboratory Technology and the Master's program in Public Health at Universitas Kader Bangsa, with the assistance of students, in collaboration with the non-communicable disease (PTM) program coordinator at the Nagaswidak Community Health Center (Puskesmas) and the management of the "Sayang Ibu" Integrated Health Post (Posbindu).

Digital recording system. The team set up a Google Form linked to a Google Sheet. The form captures resident identification—including a unique record number—along with the date of the screening, the time of the resident's last meal, their random blood glucose (RBG) level, and any referral notes. Input fields for test results are restricted to numerical values within a reasonable range to minimize typing errors. The spreadsheet automatically categorizes RBG levels—normal (<140 mg/dL), high (140–199 mg/dL), and very high/requiring referral (≥200 mg/dL)—using color-coding; it also displays the individual history for each resident and provides a monthly summary. Editing access to the spreadsheet is restricted to the community health volunteer coordinator and public health center (puskesmas) staff to ensure data confidentiality.

Stages of the activity.

1. Pre-test and manual recording simulation. Community health volunteers (kader) complete a 10-item knowledge test, followed by a manual recording exercise using 10 sample datasets from resident health screenings (including identity, date, time of last meal, and

random blood glucose/GDS results) on a paper-based register, which includes categorizing the results.

2. Training material. A 45-minute educational session covers the role of *Posbindu PTM* (Integrated Non-Communicable Disease Monitoring Post), the interpretation of random blood glucose (GDS) results and referral criteria, the principles of complete, accurate, and timely documentation, and the ethics of maintaining the confidentiality of residents' data.
3. Digital recording training. Volunteers are trained to access digital forms, input data, review entries before submission, access residents' historical health records, and compile monthly summaries. Each facilitator supports a group of 4–5 volunteers.
4. Digital recording simulation and post-test. Volunteers perform a digital recording exercise using 10 additional sample datasets, followed by a post-test and the completion of a System Usability Scale (SUS) questionnaire.
5. On-site support during *Posbindu* services. Volunteers record the random blood glucose (GDS) screening results of residents attending the session digitally, with guidance provided by the project team.

Indicators and data analysis. Completeness is calculated as the percentage of mandatory fields that are filled. Accuracy is calculated as the percentage of entries that match the source data. Classification accuracy is calculated as the percentage of GDS results that are correctly classified. Recording time is measured in minutes per data entry. Knowledge scores (0–100) are categorized as good (≥76), fair (56–75), and poor (<56). The differences in knowledge scores, completeness, accuracy, and classification accuracy follow a normal distribution and were therefore analyzed using a paired t-test. The difference in recording time does not follow a normal distribution (Shapiro–Wilk $p = 0.012$) and was therefore analyzed using the Wilcoxon test. A SUS score of ≥68 is considered good. Statistical significance is set at $p < 0.05$.

RESULTS AND DISCUSSION

Implementation of activities

The activity lasted for approximately 4 hours and involved 20 community health volunteers (kaders). At the beginning of the training, some of the more senior volunteers struggled with switching between applications and entering numerical data into the forms. These challenges were overcome through small-group mentoring and the use of illustrated guides provided to the

volunteers. The volunteers found the system helpful, as result categories appeared automatically with color-coding, and the health history of residents could be accessed without needing to consult old paper-based registers.



Figure 1. Documentation of Activities

Characteristics of a cadre member

Table 1. Characteristics of the cadres (n = 20)

Characteristics	Category	n	%
Gender	Woman	18	90,0
	Laki-laki	2	10,0
Age	25–40 years old	7	35,0
	41–55 years old	9	45,0
	>55 years old	4	20,0
Education	JUNIOR HIGH SCHOOL	4	20,0
	High school or equivalent	13	65,0
	College	3	15,0
Long-standing member	<5 years	8	40,0
	≥5 years	12	60,0
Have you ever used Google Forms?	Yes	6	30,0
	No	14	70,0

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Changes in the knowledge of cadres

Table 2. Scores and categories of cadre knowledge before and after training (n = 20)

Parameter	*Pre-test*	*Post-test*
Mean ± SD	49,5 ± 22,8	82,0 ± 17,0
Median (min–max)	50,0 (10,0–100)	80,0 (50,0–100)
Good, n (%)	2 (10,0)	15 (75,0)
Sufficient, n (%)	6 (30,0)	2 (10,0)
Insufficient, n (%)	12 (60,0)	3 (15,0)
Mean difference (95% CI)	32,5 (24,9–40,1)	
Paired t test	t = 8,98; p < 0,001	
Average N-gain	0.64 (moderate)	
Score increased/remained the same/decreased	19/1/0	

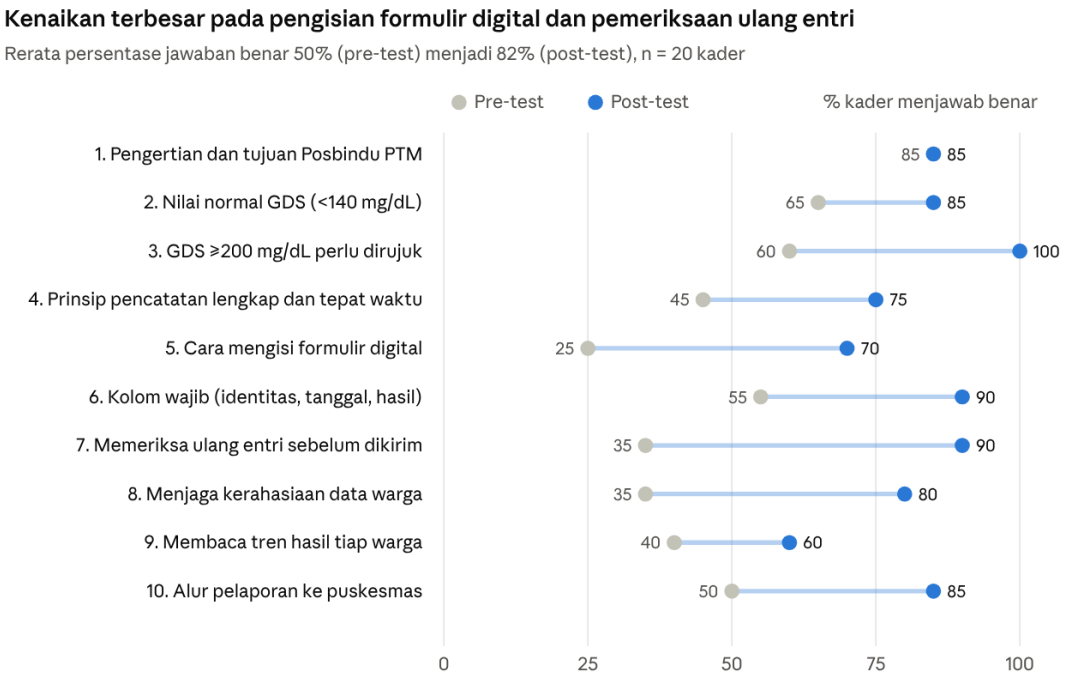


Figure 2. Percentage of community health volunteers who answered each item correctly before and after training

The mean knowledge score among community health volunteers (cadres) increased by 32.5 points ($p < 0.001$), and the proportion of cadres with a good level of knowledge rose from 10.0% to 75.0%. Figure 2 shows that the most significant improvements occurred in the procedures for completing digital forms and the practice of double-checking entries before submission—two core skills for digital record-keeping. Furthermore, all cadres understood that residents with a random blood glucose (RBG) level of ≥200 mg/dL require a referral. Conversely, the ability to interpret trends in individual residents' test results remained the lowest-performing area following the training; therefore, this skill will need to be revisited during subsequent follow-up support sessions.

Changes in recording skills

Table 3. Quality of manual and digital recording in a simulation of 10 data entries per health worker (n = 20)

Indicator	Manuals	Digital	Statistical test
Data completeness (%)	80,0 ± 8,0	96,1 ± 2,6	t = 9,98; p < 0,001
Data accuracy (%)	84,9 ± 8,2	97,0 ± 2,8	t = 7,50; p < 0,001
Accuracy of GDS result classification (%)	63,0 ± 20,2	92,6 ± 6,1	t = 7,23; p < 0,001
Recording time (minutes/data)	2,7 ± 0,6	1,4 ± 0,5	Wilcoxon p < 0,001
System Usability Scale Score	–	76,9 ± 5,5 (good)	–

Digital recording significantly improves the completeness, accuracy, and precision of data categorization, while also reducing the time required for recording by nearly half. The most notable improvement is seen in the accuracy of categorizing random blood glucose (RBG) test results; in a digital system, these categories are calculated automatically, whereas in manual recording, community health volunteers (*kader*) must determine them themselves—a process prone to errors, particularly around threshold values such as 140 or 200 mg/dL. Furthermore, the use of mandatory fields and numerical range restrictions in the forms helps minimize missing data and typographical errors. A System Usability Scale (SUS) score of 76.9 indicates that the volunteers found the system easy to use. These findings align with previous research on training community health volunteers to use Google Forms—which has been shown to simplify recording

and reporting (Marini et al., 2023; Alfiarini & Apriadi, 2024)—as well as studies on the implementation of online surveys within *posyandu* (integrated healthcare post) settings (Junaidi et al., 2021).

Recording at Posbindu services

Table 4. Results of random blood glucose (RBG) screenings for residents, recorded digitally by community health volunteers on the day of the activity (n = 32)

GDS Category	n	%
Normal (<140 mg/dL)	22	68,8
High (140–199 mg/dL)	7	21,9
Very high (≥200 mg/dL)	3	9,4

During the assistance process, community health volunteers recorded the screening results for 32 residents, achieving 100% completeness in all mandatory data fields. Three residents (9.4%) presented with a random blood glucose (RBG) level of ≥200 mg/dL and were immediately referred to the Nagaswidak Community Health Center (Puskesmas) for further evaluation, while seven residents with RBG levels between 140–199 mg/dL were scheduled for follow-up screening at the next *Posbindu* (integrated non-communicable disease monitoring post) session. The proportion of residents with above-normal RBG levels (31.3%) underscores the importance of regular monitoring—a finding consistent with the high prevalence of elevated blood glucose levels among the population as reported in the 2023 Indonesian Health Survey (SKI 2023) (Health Development Policy Agency, 2023). Through digital recording, subsequent screening results can be directly compared with previous data, making it easier to track changes in each resident's blood glucose levels over time.

Limitations

Recording skills are assessed through simulations and a single mentoring session; therefore, the long-term sustainability of system usage remains unknown. The system relies on internet connectivity and the community health workers' (cadres') own smartphones, while the proficiency of older cadres varies. Furthermore, blood glucose (GDS) testing using point-of-care

testing (POCT) devices serves only as a screening method and requires further confirmation for a formal diagnosis.

Conclusions and Suggestions

Conclusions

Training on digital record-keeping significantly improved the knowledge of Posbindu (integrated non-communicable disease post) volunteers (from 49.5 to 82.0; $p < 0.001$; N-gain 0.64). Compared to manual recording, digital recording enhanced the completeness and accuracy of data—including the correct categorization of blood glucose results—and reduced the time required for documentation; furthermore, the system was deemed user-friendly by the volunteers. Digital recording assists volunteers in identifying and referring individuals with high blood glucose levels, as well as in monitoring each person's results over time.

Suggestions

1. For Posbindu Sayang Ibu: implement the use of digital forms for all Posbindu activities, appoint a coordinator among the volunteers (kaders) to oversee data quality, and maintain a supply of backup (paper) forms in case of internet connectivity issues.
2. For Puskesmas Nagaswidak: utilize digital summaries to monitor non-communicable diseases (NCDs) and expand this practice to other Posbindu units within its service area, while ensuring the security and confidentiality of residents' data.
3. For future initiatives: evaluate the sustainability of the system over the next 3–6 months, incorporate blood pressure recording and other NCD-related indicators, and provide training for volunteers (kaders) on how to interpret trends in residents' health results.

Thank-you note

The community service team expresses its gratitude to Universitas Kader Bangsa Palembang—through its Institute for Research and Community Service (LPPM UKB)—for its support; to the Head of the Nagaswidak Community Health Center (Puskesmas) and the coordinator of the Non-Communicable Disease (PTM) program; to the administrators and volunteers (kader) of the "Posbindu Sayang Ibu" health post; to the head of RT 14 RW 04 in the 11 Ulu sub-district; and to all the students and local residents who participated.

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