

ORIGINAL ARTICLE

Knowledge, Attitude and Practice Regarding Diabetes Self-Management Education and Support Among Healthcare Workers at Levy Mwanawasa University Teaching Hospital, Zambia

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ABSTRACT

Background: Diabetes mellitus is an escalating global health concern, especially in low- and middle-income countries like Zambia. This study examined healthcare workers' (HCWs) knowledge, attitudes, and practices (KAP) regarding diabetes self-management education and support (DSMES) at Levy Mwanawasa University Teaching Hospital (LMUTH).

Objectives: The primary objective was to assess DSMES-related KAP among HCWs. Secondary objectives explored the influence of professional background, work experience, and academic qualifications on KAP outcomes.

Methods: A cross-sectional study was conducted using structured questionnaires administered to 100 HCWs. Data were analysed using SPSS version 29, employing descriptive statistics and bivariate logistic regression.

Results: Most participants were female (72%) and aged under 35 years (73%). Nurses formed the

majority (60%), with 62% holding diplomas and 53% having less than five years of experience. About 61% had good knowledge, 54% exhibited positive attitudes, and 84% demonstrated good DSMES-related practices. Participants over 35 years had significantly greater odds of possessing good knowledge (aOR = 5.806, $p < 0.001$). Nurses were more likely to demonstrate good knowledge (aOR = 14.389, $p = 0.044$) and positive attitudes (aOR = 25.700, $p = 0.007$) compared to physicians. DSMES resource use positively correlated with attitudes (aOR = 4.944, $p = 0.026$) and practices (aOR = 9.482, $p = 0.017$).

Conclusions: Demographic and professional factors significantly influenced DSMES-related KAP among HCWs at LMUTH. Tailored interventions are necessary to address disparities and enhance DSMES delivery.

INTRODUCTION

Diabetes mellitus is a chronic non-communicable disease marked by persistent hyperglycaemia due to insulin deficiency or resistance. If uncontrolled,

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diabetes can cause acute complications and long-term organ damage, particularly to the cardiovascular, renal, visual, and nervous systems.^{1, 2, 3} The global prevalence of diabetes is rapidly rising, especially in low- and middle-income countries where healthcare systems often lack capacity to manage chronic diseases effectively.³ In Zambia, diabetes poses a growing public health threat, worsened by limited public awareness, infrastructural constraints, and inadequate training of healthcare workers.⁴

Diabetes self-management education and support (DSMES) is essential for empowering patients to manage their condition. Healthcare workers (HCWs) are central to DSMES delivery. Their knowledge, attitudes, and practices (KAP) play a pivotal role in ensuring successful patient education and support.⁵ Studies from diverse settings, including China, India, Saudi Arabia, Iran, and Argentina, report gaps in HCWs' DSMES-related competencies and integration into clinical workflows due to limited training and resource constraints.^{6, 7, 8, 9, 10} Similar findings in South Africa and Egypt underscore insufficient diabetes-specific training among HCWs.^{11, 12} Despite national efforts in Zambia to combat non-communicable diseases, there is limited empirical evidence on DSMES engagement among HCWs. This study seeks to assess the KAP of HCWs concerning DSMES at Levy Mwanawasa University Teaching Hospital (LMUTH) in Lusaka, Zambia, to inform policy and workforce development.

METHODS

Study Design

A descriptive cross-sectional study was conducted among healthcare workers at Levy Mwanawasa University Teaching Hospital to assess their knowledge, attitudes, and practices related to diabetes self-management education and support.

Study Population and Sampling

The study population included physicians, nurses, pharmacists, and dietitians directly involved in diabetes care. Purposive sampling was employed to

ensure the inclusion of professional cadres most involved in DSMES delivery. This sampling technique was deemed appropriate given the specialized focus of the study and the need to capture perspectives from HCWs with direct roles in DSMES-related interventions. A minimum sample size of 97 was calculated using the single-proportion formula with 95% confidence ($z = 1.96$), estimated proportion ($p = 0.5$), and margin of error ($d = 0.1$). The sample was rounded to 100 to account for potential non-response. The final sample comprised 100 participants: 60 nurses, 20 physicians, 15 pharmacists, and 5 dietitians. The unequal distribution among professions reflects their actual representation in diabetes care delivery at LMUTH, where nurses form most of the clinical workforce. This pragmatic approach ensured adequate representation of key contributors to DSMES within the hospital setting.

Inclusion and Exclusion Criteria

Eligible participants were those who had at least one year of professional experience in clinical settings and who voluntarily consented to participate in the study. HCWs who were unavailable during the data collection period or who declined consent were excluded.

Instrument Adaptation and Data Collection

A structured questionnaire was used to collect data, adapted from the validated Diabetes Self-Management Questionnaire (DSMQ) developed by Schmitt et al. (2013). The adapted tool retained core domains of the DSMQ—namely, knowledge, attitudes, and practices, as well as demographic information and DSMES exposure.

Adaptation Process:

Knowledge domain: Adapted to include both general DSMES knowledge and Zambia-specific implementation contexts.

Attitude domain: Focused on HCWs' perception of DSMES importance, complexity, and professional responsibilities.

Practice domain: Assessed the frequency, quality,

and barriers to DSMES delivery in clinical settings.

The instrument was pre-tested among 10 HCWs at M'tendere Urban Clinic to assess clarity, appropriateness, and reliability.

Scoring and Dichotomization:

Responses to knowledge and attitude items were coded as 1 (correct or positive) and 0 (incorrect, neutral, or negative).

Likert-scale items were dichotomized to simplify analysis and interpretability in logistic regression (positive = 1; neutral/negative = 0), consistent with approaches used in similar KAP studies.

Cut-off points were established at 60% to indicate "good" knowledge or practice, based on conventional KAP survey thresholds. The maximum possible scores were:

Knowledge: 7

Practice: 9

Attitude: 4

Bias Minimization and Data Quality Control

Several steps were taken to minimize bias and ensure data quality:

Selection Bias: Although purposive sampling was used, it was mitigated by targeting all relevant cadres and ensuring proportionality to their clinical roles.

Social Desirability Bias: To reduce the risk of overreporting socially desirable responses, data were collected anonymously using self-administered questionnaires, and participants were assured that their responses would remain confidential.

Instrument Reliability: The adapted questionnaire demonstrated strong internal consistency, with a Cronbach's alpha of 0.84.

Pretesting: Pretesting at a similar urban health facility confirmed content validity, clarity of items, and feasibility of the data collection process.

RESULTS

Participant Characteristics

A total of 100 healthcare professionals participated. The majority were aged 35 years (73%), female (72%), and nurses (60%). Most respondents held diploma-level qualifications (62%) and had 5 years of experience (53%). About half (51%) reported prior exposure to DSMES materials.

Table 1. Characteristics and Engagement in DSMES Among Healthcare Professionals

Characteristics	Category	N (%)
Age	≤35	73 (73%)
	>35	27 (27%)
Gender	Male	28 (28%)
	Female	72 (72%)
Profession	Physician	20 (20%)
	Nurse	60 (60%)
	Pharmacist	15 (15%)
	Dietitian	5 (5%)
Qualification	Diploma	62 (62%)
	Undergraduate	26 (26%)
	Postgraduate	10 (10%)
	Ph.D.	2 (2%)
Experience	≤5 years	53 (53%)
	>5 years	47 (47%)
Primary Tasks	Diagnosis, Treatment, and Support	19 (19%)
	Health Promotion and Counselling	20 (20%)
	General Patient Care	39 (39%)
	Supervision and Administration	3 (3%)
	Science-Based Advice on Nutrition	5 (5%)
	Quality Pharmaceutical Care	14 (14%)
Exposure to DSMES	No usage	49 (49%)
	Utilized	51 (51%)
Knowledge	Poor Knowledge	39 (39%)
	Good Knowledge	61 (61%)
Attitudes	Negative Attitudes	46 (46%)
	Positive Attitudes	54 (54%)
Practices	Poor Practices	16 (16%)
	Good Practices	84 (84%)

Knowledge of DSMES

Overall, 61% of HCWs demonstrated good knowledge (60%, i.e., 4 out of 7). Physicians and pharmacists had the highest mean knowledge scores (0.85 ± 0.37 and 0.93 ± 0.26 , respectively; p

$= 0.025$), whereas nurses had the lowest (0.60 ± 0.49). Respondents had the least understanding in areas such as structured DSMES programs and individualized patient evaluation.

Table 2. Knowledge Levels of Healthcare Workers Regarding DSMES

Statement/Questions	Physicians (Mean ± SD)	Nurses (Mean ± SD)	Pharmacists (Mean ± SD)	Dietitians (Mean ± SD)	P- Value
Q7. Rate your knowledge about diabetes self-management.	0.85 ± 0.366	0.60 ± 0.494	0.93 ± 0.258	0.80 ± 0.447	0.025
Q8. Core components of diabetes self-management education.	0.75 ± 0.444	0.45 ± 0.502	0.53 ± 0.516	0.60 ± 0.548	0.139
Q9. Agree with "I know that people who don't need insulin have mild disease."	0.80 ± 0.57	0.53 ± 0.516	0.40 ± 0.447	0.40 ± 0.458	0.198
Q10. Can you name any structured DSMES programs?	0.45 ± 0.47	0.40 ± 0.503	0.80 ± 0.447	0.80 ± 0.447	0.483
Q11. Are DSMES services included in the organization's goals?	0.75 ± 0.63	0.60 ± 0.507	0.80 ± 0.447	0.80 ± 0.447	0.672
Q12. How do you evaluate patients for DSMES design and delivery?	0.45 ± 0.48	0.33 ± 0.504	0.20 ± 0.447	0.20 ± 0.447	0.518
Q13. Is DSMES individualized based on patients' needs?	0.40 ± 0.42	0.33 ± 0.488	0.80 ± 0.447	0.80 ± 0.447	0.334

Attitudes Towards DSMES

Positive attitudes were reported by 54% of HCWs. Physicians and dietitians expressed the most favorable attitudes. All professionals unanimously agreed on the need for continued DSMES education (Q15 = 1.00 ± 0.00). However, perceptions about the complexity of diabetes management varied across groups.

Table 3. Attitudes of Healthcare Workers Towards DSMES

Statement/Questions	Physicians (Mean ± SD)	Nurses (Mean ± SD)	Pharmacists (Mean ± SD)	Dietitians (Mean ± SD)	P-Value
Q14. DSMES is essential in diabetes care.	0.85 ± 0.36	0.67 ± 0.47	0.80 ± 0.41	0.80 ± 0.45	0.374
Q15. It is important for professionals to update their knowledge on DSMES.	1.00 ± 0.000	1.00 ± 0.000	1.00 ± 0.000	1.00 ± 0.000	-
Q16. Healthcare professionals should communicate well with patients.	1.00 ± 0.000	0.92 ± 0.297	0.80 ± 0.414	1.00 ± 0.000	0.167
Q17. Diabetes management is hard due to continuous effort.	0.75 ± 0.44	0.55 ± 0.502	0.47 ± 0.516	0.60 ± 0.548	0.343

DSMES Practices

DSMES-related practices were good in 84% of participants (60%, i.e., 6 out of 9 items). Most HCWs frequently educated patients, though pharmacists and dietitians reported limited access to educational materials. Barriers were more frequently cited by nurses and pharmacists.

Table 4. Practices of Healthcare Workers in DSMES Delivery

Statement/Questions	Physicians (Mean ± SD)	Nurses (Mean ± SD)	Pharmacists (Mean ± SD)	Dietitians (Mean ± SD)	P-Value
Q29. How often do you educate patients about diabetes self-management?	0.85 ± 0.366	0.87 ± 0.343	0.73 ± 0.458	0.80 ± 0.447	0.656
Q30. What resources do you use to educate patients on DSMES?	0.55 ± 0.510	0.50 ± 0.504	0.40 ± 0.407	0.40 ± 0.548	0.818
Q31. What barriers do you face in providing DSMES?	0.90 ± 0.308	0.87 ± 0.343	0.73 ± 0.458	0.80 ± 0.447	0.538

Table 5. Distribution of Knowledge, Attitudes, and Practices Scores

Variable	Category	Frequency	Percent	Valid Percent	Cumulative Percent
Knowledge	Poor	39	39%	39%	39%
	Good	61	61%	61%	100%
Attitudes	Negative	46	46%	46%	46%
	Positive	54	54%	54%	100%
Practices	Poor	16	16%	16%	16%
	Good	84	84%	84%	100%

Correlation Among KAP Scores

A significant positive correlation was observed between knowledge and attitude scores ($r = 0.351$, $p < 0.001$), and between attitudes and practices ($r = 0.234$, $p = 0.019$). However, knowledge and practices were not significantly correlated ($r = 0.115$, $p = 0.256$).

Table 6. Correlation Matrix of Knowledge, Attitudes, and Practices Scores

Variable	Knowledge Score	Attitudes Score	Practices Scores
Knowledge Score	1	0.351** ($p < 0.001$)	0.115 ($p = 0.256$)
Attitudes Score	0.351** ($p < 0.001$)	1	0.234* ($p = 0.019$)
Practices Scores	0.115 ($p = 0.256$)	0.234* ($p = 0.019$)	1

Notes:

Correlation is significant at the 0.01 level (2-tailed) (**).

Correlation is significant at the 0.05 level (2-tailed) (*).

Correlations between knowledge, attitudes, and practices are examined to understand their interrelationships.

KAP Scores and Demographic Associations

Mean total KAP scores differed significantly by age group, professional cadre, educational level, and DSMES exposure. HCWs aged >35 years had significantly higher scores (21.70 ± 3.90) than their younger counterparts ($p = 0.004$). Postgraduate degree holders had the highest mean KAP scores (24.00 ± 3.46 ; $p = 0.003$).

Table 7. Association Between Demographic Characteristics and Total KAP Score

Demographic Characteristic	Total KAP Score (Mean \pm SD)	Frequency (%)	p-value
Gender			0.228
Male	20.61 \pm 4.00	28 (28.0%)	
Female	19.54 \pm 3.92	72 (72.0%)	
Age			0.004
= 35	19.15 \pm 3.77	73 (73.0%)	
> 35	21.70 \pm 3.90	27 (27.0%)	
Profession			0.078
Physician	21.78 \pm 3.25	20 (20.0%)	
Nurse	19.40 \pm 3.48	60 (60.0%)	
Dietician	18.00 \pm 5.27	15 (15.0%)	
Pharmacist	21.80 \pm 3.90	5 (5.0%)	
Level of Education			0.003
Diploma	19.32 \pm 3.88	62 (62.0%)	
Bachelor's degree	19.27 \pm 3.48	26 (26.0%)	
Postgraduate degree	24.00 \pm 3.46	10 (10.0%)	
Doctorate	22.50 \pm 2.12	2 (2.0%)	
Work Experience			0.003
= 5 years	18.74 \pm 3.82	53 (53.0%)	
> 5 years	21.09 \pm 3.75	47 (47.0%)	
Exposure to DSMES Material			0.003
None	18.71 \pm 3.56	51 (51.0%)	
Brochure and Pamphlets	21.02 \pm 4.03	49 (49.0%)	

Logistic Regression Findings

Multivariate logistic regression analyses revealed the following:

Knowledge: Age >35 years was a significant predictor of good knowledge (aOR = 5.806, 95% CI: 1.890–17.872; $p < 0.001$). Nurses were more likely than physicians to have good knowledge (aOR = 14.389, 95% CI: 1.725–120.040; $p = 0.044$).

Attitudes: Nurses had higher odds of positive attitudes than physicians (aOR = 25.700, 95% CI: 2.326–283.700; $p = 0.007$). DSMES exposure also showed a significant association ($p = 0.026$).

Practices: Prior exposure to DSMES materials significantly predicted good practice (aOR = 9.482, 95% CI: 1.455–61.818; $p = 0.017$).

Reference categories:

Age: 35 years

Profession: Physicians

Experience: >5 years

DSMES Exposure: None

Table 8. Logistic Regression Analysis for Knowledge, Attitudes, and Practices

Knowledge				
Independent Variable	Categories	OR (95% CI)	aOR (95% CI)	P-value
Age	= 35 years	1.000	1.000	<0.001
	> 35 years	12.092 (4.212, 34.652)	5.806 (1.890, 17.872)	
Profession	Physicians	Reference	Reference	0.044
	Nurses	8.085 (1.069, 61.060)	14.389 (1.725, 120.040)	
	Pharmacists	3.706 (0.470, 29.217)	3.271 (0.363, 29.482)	
	Dieticians	0.788 (0.044, 14.071)	0.158 (0.012, 2.035)	
Experience	= 5 years	9.067 (2.217, 37.085)	9.067 (2.217, 37.085)	0.003
	> 5 years	Reference	Reference	
Exposure to DSMES	No	Reference	Reference	0.649
	Yes	0.207 (0.014, 3.057)	0.207 (0.014, 3.057)	

Attitude

Independent Variable	Categories	OR (95% CI)	aOR (95% CI)	P-value
Age	= 35 years	1.000	1.000	<0.001
	> 35 years	6.000 (1.489, 24.143)	2.008 (0.482, 8.366)	
Profession	Physicians	Reference	Reference	0.007
	Nurses	12.171 (1.596, 92.881)	25.700 (2.326, 283.700)	
	Pharmacists	3.382 (0.452, 25.345)	0.139 (0.010, 1.957)	
	Dieticians	0.731 (0.041, 13.137)	0.077 (0.005, 1.246)	
Experience	= 5 years	2.118 (0.793, 5.663)	2.118 (0.793, 5.663)	0.146
	> 5 years	Reference	Reference	
Exposure to DSMES	No	Reference	Reference	0.026
	Yes	4.944 (1.222, 20.041)	0.139 (0.014, 1.374)	

Practice

Independent Variable	Categories	OR (95% CI)	aOR (95% CI)	P-value
Age	= 35 years	1.000	1.000	0.676
	> 35 years	0.175 (0.030, 1.007)	0.175 (0.030, 1.007)	
Profession	Physicians	Reference	Reference	0.154
	Nurses	5.258 (0.980, 28.146)	0.331 (0.031, 3.533)	
	Pharmacists	3.945 (0.700, 22.264)	0.229 (0.019, 2.692)	
	Dieticians	3.945 (0.700, 22.264)	0.229 (0.019, 2.692)	
Experience	= 5 years	0.782 (0.280, 2.186)	0.782 (0.280, 2.186)	0.640
	> 5 years	Reference	Reference	
Exposure to DSMES	No	Reference	Reference	0.017
	Yes	9.482 (1.455, 61.818)	9.482 (1.455, 61.818)	

Hierarchical Regression Results

Hierarchical multiple regression showed age and profession were key predictors of KAP score variance. Inclusion of age group improved model R² from 0.015 to 0.088, while addition of profession in Model 3 brought it to 0.106.

Table 9. Hierarchical Multiple Regression Analysis Results

Model	Predictor	B	SE	Beta	t	Sig.	R ²	R ²
Model 1	(Constant)	20.607	0.745		27.665	<0.001	0.015	0.015
	Gender	-1.065	0.878	-0.122	-1.214	0.228		
Model 2	(Constant)	19.564	0.814		24.038	<0.001	0.088	0.073
	Gender	-0.529	0.872	-0.060	-0.608	0.545		
	Age Group	2.434	0.881	0.275	2.761	0.007		
Model 3	(Constant)	20.001	0.869		23.013	<0.001	0.106	0.018
	Gender	-0.347	0.877	-0.040	-0.396	0.693		
	Age Group	2.688	0.896	0.304	2.999	0.003		
	Profession	-0.509	0.367	-0.138	-1.387	0.169		
Model 4	(Constant)	19.407	0.905		21			

DISCUSSION

This study assessed the knowledge, attitudes, and practices (KAP) of healthcare workers (HCWs) regarding diabetes self-management education and support (DSMES) at a tertiary hospital in Zambia. The findings indicate that while overall KAP levels were moderate to high, significant disparities existed between professional cadres. Physicians and pharmacists recorded the highest knowledge scores, likely reflecting their access to advanced clinical training and continuing professional education. In contrast, nurses, despite being the primary point of care for most patients, demonstrated notable knowledge gaps. This trend is consistent with findings from Ethiopia and Nigeria, where nurses have similarly shown limited DSMES-specific training.^{17, 18} Attitudinal differences mirrored

professional training backgrounds. Dietitians and physicians were more likely to express positive attitudes toward DSMES, particularly regarding the importance of communication and the need for continuous education. However, perceived difficulties in delivering DSMES, especially among dietitians and pharmacists, highlight possible psychosocial stressors, such as burnout and role overload. These challenges are consistent with international literature on HCW burnout and its impact on patient education delivery.¹⁹ The findings underscore the importance of fostering supportive work environments to enhance professional attitudes and commitment to DSMES. Despite 84% of participants reporting good DSMES-related practices, several cadres simultaneously identified critical barriers such as inadequate time, limited

access to educational materials, and lack of structured DSMES protocols. This paradox suggests a possible overestimation of DSMES engagement due to social desirability bias or inconsistent understanding of what constitutes DSMES. It further emphasizes the need to critically appraise self-reported practices considering structural challenges, a pattern similarly observed in studies from South Africa and Kenya.^{20, 21} The statistically significant correlations observed between knowledge and attitudes, and between attitudes and practices—suggest that improving one domain may positively influence others. This is in line with the Theory of Planned Behavior, which posits that attitudes play a mediating role in transforming knowledge into action.²²

As such, strengthening HCWs' knowledge alone may not be sufficient; their attitudes and perceived behavioral control must also be addressed.

1. To translate these findings into practice, targeted interventions are urgently needed. These should include:
2. Integrating DSMES modules into pre-service nursing and allied health curricula to build foundational competencies.
3. Establishing structured, cadre-specific in-service training to address existing knowledge and skill gaps;
4. Allocating dedicated institutional budgets and time for DSMES delivery, particularly in outpatient departments.
5. Standardizing DSMES protocols and resources across clinical departments to reduce variability in patient education.
6. Strengthening supportive supervision and mentorship frameworks to sustain HCW motivation and performance.

These strategies align with Zambia's National NCD Strategic Plan and are critical for strengthening the country's capacity to manage diabetes through empowered and competent health personnel.

CONCLUSION

This study highlights a generally competent HCW population in DSMES delivery at LMUTH, albeit with profession-based disparities. Targeted in-service training, improved access to DSMES resources, and supportive workplace policies are necessary to enhance the quality of diabetes care. These measures align with national strategies for non-communicable disease control and workforce development.

Authors' contributions

Writing of manuscript, Kelvin Kunda; Supervision, Yong Liu. All authors have read and agreed to the published version of the manuscript.

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Ethics approval and consent to participate

Ethical approval for this study was obtained from the University of Zambia Biomedical Research Ethics Committee (REF. No. 4470-2023) and the Zambia National Health Research Authority (Ref No: NHRA0001/19/12/2023). Informed consent was obtained from all participants, ensuring that their participation was voluntary and confidential. Participants were informed of their right to withdraw from the study at any time without consequence. Data were anonymized during analysis to maintain participant confidentiality. The study also complied with ethical guidelines governing research involving human subjects.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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