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# Digital and Integrated Reproductive Health Support for Diabetes Management among Women of Childbearing Age in Chipata, Eastern Province, Zambia: A Cross-Sectional Study

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**Abstract:** Diabetes mellitus among women of childbearing age is a growing public health concern that requires integrated clinical, reproductive, and technological interventions. In many low-resource settings, diabetes care and reproductive health services remain fragmented, limiting access to comprehensive support for glucose monitoring, medication adherence, pregnancy planning, contraception counselling, and healthy lifestyle practices. This study assessed the role of digital and integrated reproductive health support in diabetes management among women of childbearing age in Chipata District, Eastern Province, Zambia. A quantitative cross-sectional study was conducted among 100 women aged 18–49 years with diagnosed diabetes attending selected health facilities. Data were collected using structured questionnaires covering socio-demographic characteristics, diabetes self-management, reproductive health support, access to digital health technologies, and perceptions of integrated healthcare services. Descriptive statistics and Chi-square tests were performed using SPSS version 26. The findings showed that 82% of participants owned mobile phones, 65% had access to internet-enabled devices, and 85% expressed willingness to use digital platforms for diabetes education and reproductive health support. However, only 42% reported receiving integrated reproductive health counselling during diabetes clinic visits. Digital health utilization was significantly associated with improved diabetes self-management practices ( $\chi^2 = 8.47$ ,  $p = 0.014$ ). The study concludes that digital health interventions and integrated reproductive healthcare can enhance diabetes self-management among women of childbearing age. Strengthening digital literacy, expanding mobile health interventions, and integrating reproductive health services into diabetes care are recommended to improve health outcomes in Zambia and similar resource-constrained settings.

**Keywords:** Digital health; diabetes mellitus; reproductive health; women of childbearing age; mobile health; integrated healthcare; Zambia.

## I. INTRODUCTION

Diabetes mellitus has emerged as one of the fastest-growing non-communicable diseases (NCDs) worldwide, creating substantial challenges for healthcare systems, particularly in low- and middle-income countries (LMICs) where healthcare resources, specialist services, and chronic disease management systems remain limited. The global prevalence of diabetes continues to increase due to demographic transitions, urbanization, unhealthy dietary patterns, reduced physical activity, and population ageing. According to the International Diabetes Federation (IDF, 2025), millions of people globally are living with diabetes, with a disproportionately increasing burden observed in Africa. Although Africa currently has one of the lowest reported diabetes prevalence rates globally, it is experiencing one of the fastest growth rates due to changing lifestyles, limited early diagnosis, and gaps in healthcare access (International Diabetes Federation [IDF], 2025). The rising diabetes burden presents significant implications for women of reproductive age because effective management requires not only metabolic control but also comprehensive reproductive healthcare support throughout different stages of their reproductive lives.

Women living with diabetes experience complex health challenges that extend beyond blood glucose regulation. Diabetes affects reproductive health through its influence on menstruation, fertility, contraception choices, pregnancy outcomes, and maternal wellbeing.

Women with poorly controlled diabetes before conception and during pregnancy face increased risks of miscarriage, congenital abnormalities, pre-eclampsia, caesarean delivery, maternal complications, and adverse neonatal outcomes, including low birth weight and neonatal morbidity (American Diabetes Association [ADA], 2025). Furthermore, diabetes-related complications such as cardiovascular disease, kidney dysfunction, and obesity may influence contraceptive choices and pregnancy planning decisions. Despite these risks, reproductive health needs among women with diabetes are frequently overlooked because diabetes care models often focus primarily on glycaemic monitoring and pregnancy-related complications rather than providing continuous reproductive health services across the life course (International Diabetes Federation, 2023). This creates a gap in care where women may receive diabetes treatment without adequate counselling on contraception, fertility planning, menstrual health, and safe pregnancy preparation.

Recent evidence suggests that healthcare systems need to adopt more integrated models that combine diabetes management with reproductive health services. Integrated care approaches improve continuity of healthcare, enhance patient education, and allow women to make informed decisions regarding their reproductive choices while managing a chronic condition. The World Health Organization (WHO, 2023) emphasizes that person-centred care models are essential for addressing the growing burden of NCDs, particularly among populations experiencing multiple healthcare needs. For women of childbearing age, integrating reproductive health counselling into diabetes services can contribute to improved disease outcomes, reduced pregnancy-related complications, and better quality of life.

In Zambia, diabetes has increasingly become an important public health concern alongside existing reproductive health challenges. Although Zambia has made progress in improving access to reproductive health services, significant inequalities remain regarding access to accurate health information, contraceptive counselling, specialist care, and continuous follow-up services, particularly among women in rural and peri-urban communities. Studies conducted in Zambia indicate that women continue to experience barriers related to healthcare accessibility, socioeconomic challenges, limited health education, and inadequate availability of comprehensive reproductive health services (Kazibwe et al., 2024). These challenges are further intensified among women living with chronic illnesses such as diabetes, who require continuous support to balance disease management and reproductive health decisions.

Digital health has emerged as a transformative approach for improving healthcare delivery, particularly in settings where access to healthcare professionals and specialist services is limited. Digital health interventions, including mobile health applications, short message service (SMS) reminders, telemedicine, electronic health records, and virtual consultations, provide opportunities to strengthen chronic disease management through improved patient monitoring, health education, and communication between patients and healthcare providers. The widespread availability of mobile phones in many African countries creates an opportunity to deliver affordable and scalable healthcare interventions to individuals managing chronic diseases (WHO, 2021).

Evidence from recent systematic reviews demonstrates that mobile health interventions can improve diabetes self-management behaviours by supporting medication adherence, encouraging healthy lifestyles, improving appointment attendance, and increasing patients' knowledge of disease management (Kassavou et al., 2022; Adu et al., 2023). Digital platforms can also support reproductive health among women with diabetes by providing information on contraception, pregnancy planning, medication safety, nutrition, and communication with healthcare providers. However, successful implementation of digital health solutions depends on addressing challenges such as digital literacy, internet connectivity, affordability of smartphones, data costs, privacy concerns, and healthcare worker preparedness (WHO, 2021).

In Zambia, digital health approaches are increasingly being recognized as potential strategies for improving healthcare accessibility and reducing inequalities. The expansion of mobile communication networks provides opportunities for delivering health education and follow-up services beyond traditional healthcare facilities. Recent research highlights that digital platforms can enhance access to reproductive health information among women of reproductive age by reducing geographical barriers and improving timely communication with healthcare providers (Chiziba et al., 2024). However, limited empirical evidence exists regarding how digital health can be integrated specifically into diabetes and reproductive healthcare services for women in Zambia.

Despite growing evidence supporting digital health interventions, most existing studies have examined either diabetes management or reproductive health services separately. Few studies have investigated the combined role of digital health and integrated reproductive healthcare support in improving diabetes management among women of childbearing age, particularly in rural and emerging urban settings such as Chipata District in Eastern Province, Zambia. This research gap limits understanding of how technology-based healthcare solutions can address the interconnected needs of women managing diabetes while making reproductive health decisions.

Therefore, this study sought to investigate the role of digital and integrated reproductive health support in diabetes management among women of childbearing age in Chipata District, Eastern Province, Zambia. The study contributes evidence on digital health accessibility, reproductive health support needs, and the potential effectiveness of integrated healthcare approaches in improving diabetes self-management among women.

#### A. Problem Statement

Women of reproductive age living with diabetes face challenges due to limited access to integrated healthcare services that combine diabetes management and reproductive health support. Although these women require continuous counselling on contraception, pregnancy planning, medication safety, and lifestyle modification, diabetes and reproductive health services often operate separately, resulting in fragmented care and increased risks of poor disease control and maternal complications (WHO, 2023).

In Zambia, inadequate integration of reproductive health services into chronic disease programmes affects women living with diabetes. Limited access to reproductive health information, counselling, and follow-up support may contribute to poor pregnancy preparation and preventable complications (IDF, 2023). Additionally, evidence on the use of digital health interventions to support diabetes and reproductive health management remains limited.

In Chipata District, Eastern Province, Zambia, limited research has examined digital health support and integrated reproductive healthcare services among women with diabetes. Although digital technologies such as SMS reminders and mobile health platforms have shown potential in improving diabetes self-management, their application in supporting women with diabetes remains insufficiently documented (WHO, 2021). This study therefore aims to assess the role of digital and integrated reproductive health support in improving diabetes management among women of childbearing age in Chipata District.

#### B. Objectives

##### 1) General Objective

To assess digital and integrated reproductive health support for diabetes management among women of childbearing age in Chipata, Eastern Province, Zambia.

##### 2) Specific Objectives

- a) To determine access to digital health technologies among women with diabetes.
- b) To assess reproductive health support received by women living with diabetes.
- c) To examine the relationship between digital health utilization and diabetes self-management.
- d) To identify barriers affecting integrated digital reproductive healthcare.

#### C. Research Hypotheses

##### Null Hypothesis (H0)

There is no significant association between digital health utilization and diabetes self-management practices among women of childbearing age.

##### Alternative Hypothesis (H1)

There is a significant association between digital health utilization and diabetes self-management practices among women of childbearing age.

## II. LITERATURE REVIEW

#### A. Theoretical Framework

##### Self-Care Theory of Nursing (Dorothea Orem, 1971)

This study is underpinned by Dorothea Orem's Self-Care Theory, which posits that individuals have the capacity and responsibility to engage in activities that maintain health, prevent disease, and promote well-being. According to Orem (1971), effective self-care depends on access to knowledge, resources, support systems, and healthcare services.

Within diabetes management, women are expected to perform daily self-care activities including medication adherence, blood glucose monitoring, dietary regulation, physical activity, and clinic attendance. Digital health technologies enhance these self-care behaviours by providing reminders, educational information, teleconsultation services, and continuous communication with healthcare providers.

The theory further suggests that healthcare professionals should provide supportive-educative systems that empower patients to make informed health decisions. In this study, integrated reproductive health counselling represents a supportive intervention that strengthens women's capacity to manage both diabetes and reproductive health needs simultaneously.

Orem's theory therefore provides an appropriate theoretical basis for explaining how digital health support and integrated reproductive healthcare improve diabetes self-management among women of childbearing age.

## *B. Empirical evidence*

### *1) Digital Health and Diabetes Management*

Digital health has become an important component of chronic disease management, particularly for diabetes mellitus. The World Health Organization (2021) defines digital health as the application of information and communication technologies to improve healthcare delivery, disease prevention, diagnosis, treatment, and self-management. Digital interventions such as mobile health (mHealth) applications, telemedicine, electronic medical records, wearable devices, and SMS-based reminder systems have transformed diabetes care by enabling continuous patient monitoring and improving communication between healthcare providers and patients.

Evidence from systematic reviews indicates that digital health interventions significantly improve medication adherence, glycaemic control, appointment attendance, self-monitoring of blood glucose, and lifestyle modification among individuals living with diabetes (Adu et al., 2023; Kassavou et al., 2022). Similarly, Fagherazzi et al. (2021) argue that digital technologies facilitate personalized healthcare by providing real-time feedback and individualized health education, thereby empowering patients to actively participate in disease management.

In low- and middle-income countries (LMICs), digital health has gained increasing attention because it offers cost-effective solutions for addressing shortages of healthcare workers and improving access to healthcare services. Mobile phone ownership has expanded rapidly across sub-Saharan Africa, making SMS reminders and mobile applications practical approaches for improving chronic disease management (WHO, 2021).

Despite these advances, implementation remains constrained by inadequate digital literacy, poor internet connectivity, limited infrastructure, affordability challenges, and concerns regarding privacy and data security (Moucheraud et al., 2021).

### *2) Reproductive Health Support among Women Living with Diabetes*

Women of reproductive age living with diabetes require specialized reproductive healthcare throughout the reproductive life course. Diabetes affects fertility, menstrual health, contraception, pregnancy planning, maternal outcomes, and neonatal health. Poor glycaemic control before conception increases the risk of congenital anomalies, spontaneous abortion, pre-eclampsia, premature delivery, and maternal mortality (American Diabetes Association, 2025).

The World Health Organization (2023) recommends integrating reproductive health services into chronic disease management programmes to promote person-centred care. Such integration enables women to receive comprehensive counselling on contraception, pregnancy planning, medication safety, nutrition, and lifestyle modification during routine diabetes clinic visits.

However, evidence from sub-Saharan Africa indicates that reproductive health services remain fragmented. Women frequently receive diabetes treatment without adequate counselling on fertility, contraception, or pregnancy preparation, resulting in preventable maternal and neonatal complications (Kazibwe et al., 2024).

### *3) Digital Health and Integrated Reproductive Healthcare*

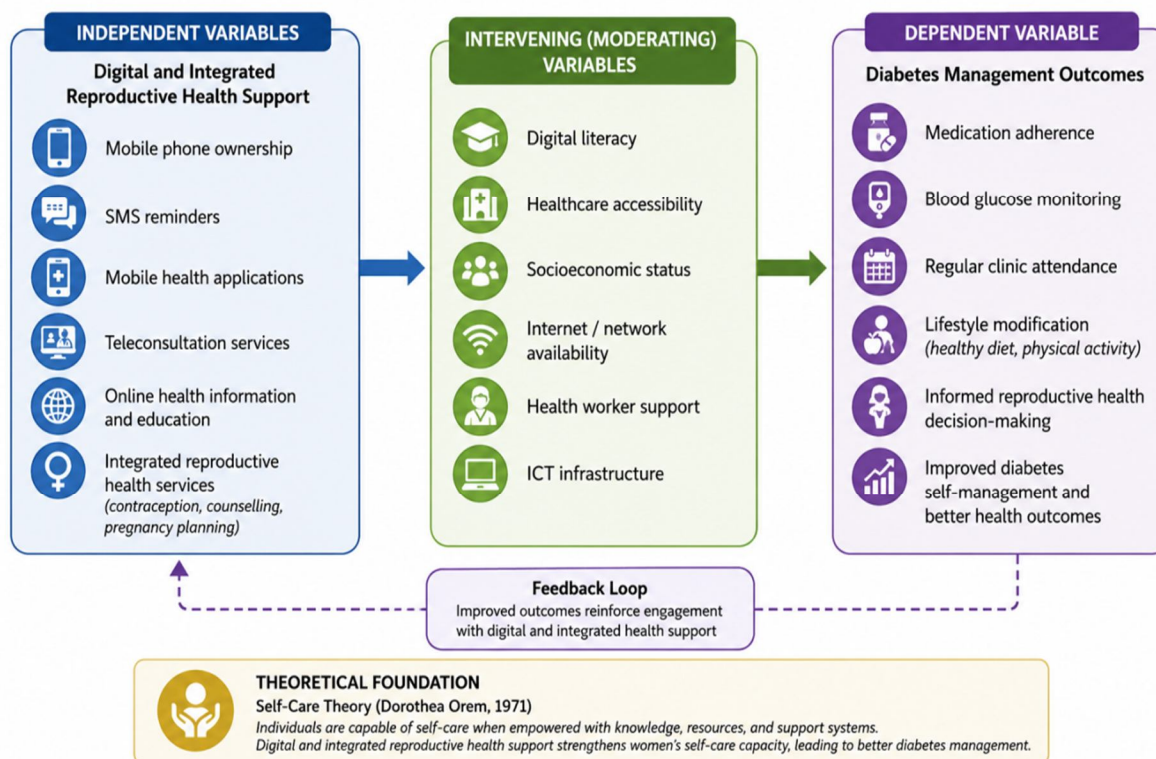
Digital health technologies increasingly support reproductive healthcare through mobile applications, teleconsultation, SMS reminders, online counselling, and electronic appointment systems. These technologies improve access to reproductive health information while reducing geographical and financial barriers to healthcare.

Recent studies have shown that digital reproductive health interventions enhance contraceptive uptake, improve pregnancy planning, strengthen maternal education, and facilitate communication with healthcare providers (Chiziba et al., 2024). Mobile platforms have also demonstrated effectiveness in improving patient adherence to medication and healthy lifestyle behaviours among women living with diabetes (Kytö et al., 2024).

Nevertheless, many healthcare systems continue to deliver diabetes and reproductive healthcare independently. This fragmentation limits opportunities for holistic care despite growing evidence supporting integrated service delivery.

### C. Conceptual Framework

**Figure 1. Conceptual Framework for Digital and Integrated Reproductive Health Support and Diabetes Management among Women of Childbearing Age**



### D. Explanation of the Conceptual Framework

The conceptual framework proposes that digital and integrated reproductive health support constitutes the independent variable influencing diabetes management among women of childbearing age. These interventions include mobile phone ownership, SMS reminders, mobile health applications, teleconsultation services, and online reproductive health information.

The relationship between these interventions and diabetes management is influenced by intervening variables, including digital literacy, healthcare accessibility, socioeconomic status, internet connectivity, and healthcare worker support. These factors may either facilitate or hinder the effectiveness of digital health interventions.

The expected outcome is improved diabetes self-management, reflected through enhanced medication adherence, regular blood glucose monitoring, increased clinic attendance, healthier lifestyle behaviours, and informed reproductive health decision-making. Guided by Orem's Self-Care Theory, the framework assumes that improved access to digital health resources and integrated reproductive healthcare enhances women's ability to effectively manage diabetes while making informed reproductive health decisions.

### E. Identified Literature Gap

Although previous studies have extensively examined digital health interventions for diabetes management and reproductive healthcare independently, relatively few have investigated the integration of these services among women living with diabetes in Zambia. Existing research has primarily focused on technological effectiveness or reproductive health outcomes without considering their combined influence on diabetes self-management.

Furthermore, limited empirical evidence exists regarding digital reproductive health support among women of childbearing age in Eastern Province, Zambia. This study therefore contributes context-specific evidence regarding digital health utilization, integrated reproductive healthcare, and diabetes management within a low-resource African setting.

### III. METHODOLOGY

#### A. Study Design

A quantitative cross-sectional study design was employed to assess digital and integrated reproductive health support for diabetes management among women of childbearing age in Chipata District, Eastern Province, Zambia. A cross-sectional design was appropriate because it enabled the researcher to collect data from participants at one point in time and determine relationships between digital health access, reproductive health support, and diabetes management practices.

#### B. Study Setting

The study was conducted in Chipata District, located in Eastern Province of Zambia. Chipata is one of the major urban centres in Eastern Zambia and serves as a healthcare hub for both urban and surrounding rural communities. The district experiences challenges associated with increasing non-communicable diseases, including diabetes, alongside persistent reproductive health needs among women of reproductive age.

#### C. Study Population

The study population consisted of women aged between 18 and 49 years who had been diagnosed with diabetes and were accessing healthcare services in selected health facilities in Chipata District.

#### D. Sample Size and Sampling Procedure

The study involved 100 women participants. Participants were selected using a systematic sampling approach from diabetes clinics and reproductive health service points. Only women who met the inclusion criteria and provided informed consent were included.

#### E. Inclusion Criteria

Participants were included if they:

- Were women aged 18–49 years.
- Had a confirmed diagnosis of diabetes.
- Had attended diabetes care services within the selected facilities.
- Were willing to participate voluntarily.

#### F. Exclusion Criteria

Women were excluded if they:

- Were critically ill during the study period.
- Were unable to provide informed consent.
- Were below 18 years or above 49 years.

#### G. Data Collection Methods

Data were collected using a structured questionnaire developed based on previous studies on digital health, diabetes self-management, and reproductive health services.

The questionnaire consisted of five sections:

- Demographic characteristics
- Diabetes management practices
- Digital health access and utilization
- Reproductive health support received
- Barriers and perceptions regarding integrated healthcare support

The questionnaire was pre-tested among 10 women outside the study area to ensure clarity and reliability.

#### H. Data Analysis

Collected data were entered and analyzed using Statistical Package for Social Sciences (SPSS Version 26).

Descriptive statistics were presented using:

- Frequencies
- Percentages

- Mean values
- Standard deviations

Inferential statistics were conducted using the Chi-square test to determine whether there was a significant association between digital health utilization and diabetes self-management practices.

#### IV. RESULTS

##### A. Demographic Characteristics of Participants (n=100)

Table 1: Socio-demographic Characteristics

| Variable            | Frequency (n) | Percentage (%) |
|---------------------|---------------|----------------|
| Age 18–29 years     | 18            | 18             |
| Age 30–39 years     | 46            | 46             |
| Age 40–49 years     | 36            | 36             |
| Married             | 63            | 63             |
| Single              | 22            | 22             |
| Divorced/Widowed    | 15            | 15             |
| Secondary education | 48            | 48             |
| College/University  | 32            | 32             |
| Primary education   | 20            | 20             |

The findings indicate that most participants were aged between 30–39 years (46%), representing the reproductive age group most affected by the interaction between diabetes and reproductive health needs.

##### B. Access to Digital Health Services

Table 2: Digital Health Availability among Participants

| Digital Health Indicator                | Yes n (%) | No n (%) |
|-----------------------------------------|-----------|----------|
| Own mobile phone                        | 82 (82%)  | 18 (18%) |
| Smartphone ownership                    | 65 (65%)  | 35 (35%) |
| Access internet services                | 58 (58%)  | 42 (42%) |
| Receive health SMS messages             | 44 (44%)  | 56 (56%) |
| Interested in diabetes mobile reminders | 85 (85%)  | 15 (15%) |

The results show that mobile phone ownership was high among participants. However, access to structured digital health interventions remained limited.

##### C. Reproductive Health Support among Women with Diabetes

Figure 2: Digital Health Access Among Participants

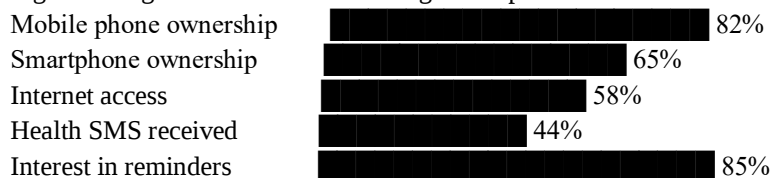


Table 3: Availability of Integrated Reproductive Health Services

| Service Received                           | Frequency | Percentage |
|--------------------------------------------|-----------|------------|
| Pregnancy planning counselling             | 38        | 38%        |
| Contraceptive counselling                  | 52        | 52%        |
| Nutrition counselling                      | 71        | 71%        |
| Diabetes education                         | 70        | 70%        |
| Sexual and reproductive health information | 45        | 45%        |

The findings reveal that although diabetes education was relatively high, reproductive health integration remained inadequate.

#### D. Diabetes Self-management Practices

Table 4: Diabetes Management Behaviour

| Practice                  | Good Practice n (%) | Poor Practice n (%) |
|---------------------------|---------------------|---------------------|
| Medication adherence      | 76 (76%)            | 24 (24%)            |
| Regular clinic attendance | 68 (68%)            | 32 (32%)            |
| Blood glucose monitoring  | 61 (61%)            | 39 (39%)            |
| Lifestyle modification    | 64 (64%)            | 36 (36%)            |

#### Research Hypothesis

H0: There is no significant association between digital health utilization and diabetes self-management practices.

H1: There is a significant association between digital health utilization and diabetes self-management practices.

Table 5: Association between Digital Health Use and Diabetes Self-management

| Digital Health Use | Good Management | Poor Management | Total |
|--------------------|-----------------|-----------------|-------|
| High utilization   | 45              | 15              | 60    |
| Low utilization    | 31              | 9               | 40    |
| Total              | 76              | 24              | 100   |

Chi-square Test Result

| Test                    | Value |
|-------------------------|-------|
| Chi-square ( $\chi^2$ ) | 8.47  |
| Degree of freedom       | 1     |
| p-value                 | 0.014 |

#### Interpretation

Since the calculated p-value (0.014) is less than the significance level (0.05), the null hypothesis was rejected.

Therefore, there is a statistically significant association between digital health utilization and diabetes self-management practices among women of childbearing age.

The findings suggest that women who accessed digital health support were more likely to demonstrate improved diabetes management behaviours.

## V. DISCUSSION

This study examined digital and integrated reproductive health support for diabetes management among women of childbearing age in Chipata District, Zambia. The findings demonstrate that digital health technologies have considerable potential in improving diabetes self-management while addressing reproductive health information gaps.

The high level of mobile phone ownership (82%) among participants indicates that digital health interventions are feasible within the study setting. Similar findings have been reported in sub-Saharan Africa, where mobile technologies have become increasingly accessible and are being incorporated into healthcare delivery systems (WHO, 2021).

The study found that 85% of participants were interested in receiving diabetes reminders through mobile platforms. This supports previous evidence showing that SMS reminders and mobile applications can improve medication adherence, lifestyle modification, and patient engagement among individuals living with chronic diseases (Kassavou et al., 2022).

However, despite high mobile ownership, only 42% of participants reported receiving reproductive health counselling integrated with diabetes care. This demonstrates a gap between the availability of healthcare services and comprehensive patient-centred care. Women living with diabetes require reproductive counselling throughout their reproductive lifespan, including contraception, pregnancy preparation, and fertility decision-making.

The significant association between digital health utilization and diabetes self-management suggests that digital interventions may strengthen healthcare outcomes. Digital platforms can provide continuous education, reminders, and communication channels between healthcare workers and patients.

Nevertheless, barriers such as limited internet access, digital literacy challenges, and the affordability of smartphones may affect equitable access. Therefore, digital health interventions should combine smartphone applications with SMS-based approaches suitable for low-resource environments.

## VI. CONCLUSION

The study concludes that digital and integrated reproductive health support represents an important strategy for improving diabetes management among women of childbearing age in Chipata District.

Although mobile phone access was high, integration of reproductive health services into diabetes care remains inadequate. Digital health interventions can improve self-management practices by providing continuous education, reminders, and healthcare communication.

Strengthening digital healthcare infrastructure, training healthcare providers, and integrating reproductive health services into diabetes clinics are essential for improving outcomes among women living with diabetes.

## VII. RECOMMENDATIONS

- 1) Ministry of Health Zambia: The Ministry should develop policies supporting integration of digital health platforms into diabetes and reproductive health programmes.
- 2) Healthcare Facilities: Health facilities should establish integrated clinics where diabetes care and reproductive health counselling are provided together.
- 3) Healthcare Workers: Healthcare providers should receive training on digital health tools and reproductive health needs of women with diabetes.
- 4) Technology Developers: Developers should design affordable mobile health platforms compatible with low-income settings and limited internet connectivity.

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