Journal of Medical and Health Sciences

[ISSN 2958-1079]

Volume: 05 Issue: 01 | February-2026

JMHS

PREVALENCE OF PSYCHOLOGICAL INSULIN RESISTANCE AMONG ADULTS WITH TYPE 2 DIABETES MELLITUS AT PCEA CHOGORIA HOSPITAL, KENYA

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Cite this article in APA

Kamita, L., Loftus, M., & Nambafu, J. (2026). Prevalence of psychological insulin resistance among adults with type 2 diabetes mellitus at PCEA Chogoria Hospital, Kenya. *Journal of medical and health science, 5*(1), 1-18. https://doi.org/10.51317/jmhs.v5i1.871

OPEN ACCESS

A publication of Editon Consortium Publishing (online)

Article history

Received: 2025-12-10

Accepted: 2026-01-15

Published: 2026-02-25

Scan this QR to read the paper online

Abstract

The aim of this study was to estimate the prevalence of psychological insulin resistance (PIR) among patients with Type 2 Diabetes Mellitus (T2DM) aged 18–80 years attending PCEA Chogoria Hospital, Kenya. Psychological insulin resistance represents a major challenge in the effective management of T2DM, as it often delays or prevents patients from initiating and sustaining insulin therapy. This descriptive cross-sectional study employed consecutive sampling to recruit 121 patients with T2DM attending the outpatient clinic. Data were collected using validated instruments, including the Insulin Treatment Appraisal Scale (ITAS) to assess PIR, the Generalised Anxiety Disorder-7 (GAD-7) for anxiety screening, and the Patient Health Questionnaire-9 (PHQ-9) for depression assessment. Data analysis involved chi-square tests and Fisher's exact tests to examine associations between variables. PIR was identified in (62.8%) of participants, primarily attributed to feelings of personal failure regarding disease progression reported by (77%) and fear of injections reported by (58%), indicating significant emotional and practical barriers to insulin acceptance. The RE highlight the critical role of psychological factors, particularly self-blame and needle anxiety, in insulin resistance. Integrating mental health support and tailored educational interventions into diabetes management programs may reduce PIR, improve insulin uptake, and enhance overall treatment outcomes for individuals with T2DM in rural Kenya.

Keywords: Insulin, psychological insulin resistance, type 2 diabetes mellitus.

1.0 INTRODUCTION

Delayed initiation of insulin therapy remains a persistent clinical problem in the management of type 2 diabetes mellitus (T2DM), contributing to prolonged poor glycaemia control and increased risk of complications. Despite clear clinical guidelines recommending timely insulin initiation when oral hypoglycaemia agents fail, many patients experience significant postponements, often lasting up to two years (Chen et al., 2020). These delays are frequently driven not only by clinical inertia but also by psychological barriers collectively referred to as psychological insulin resistance (PIR).

Type 2 diabetes mellitus (T2DM) is the most common form of diabetes, accounting for approximately 90 per cent of global cases. It is a chronic metabolic disorder characterised by insulin resistance and progressive pancreatic beta-cell dysfunction, often necessitating insulin therapy to achieve optimal glycaemia control. Insulin therapy is a cornerstone of T2DM management, particularly when oral medications are insufficient. However, many patients hesitate to initiate insulin despite a medical indication.

Psychological insulin resistance (PIR) refers to the reluctance or refusal by patients—and sometimes healthcare providers—to initiate or intensify insulin therapy due to negative beliefs, fears, misconceptions, or emotional responses. These may include fear of injections, concerns about dependency, perceived personal failure, stigma, and anxiety regarding disease progression (Polonsky, 2005). PIR has been recognised as a major barrier to effective diabetes management worldwide.

Globally, insulin utilisation continues to rise. In 2018, approximately 516 million 1000 IU insulin vials were used annually among individuals with type 2 diabetes, with projections increasing to 633 million by 2030 (Basu et al., 2018). As insulin dependence grows, addressing psychological and systemic barriers to its use becomes increasingly urgent.

The prevalence of PIR varies across regions. Polonsky et al. (2005) reported a prevalence of 28.2 per cent in the United States among 1,267 patients, while a study conducted in Congo reported a prevalence of 42.7 per cent (Rita et al., 2019). In Kenya, a study at Kenyatta National Hospital found a markedly higher prevalence of 82.6 per cent (Gulam et al., 2017), with perceived self-blame and fear of disease progression identified as major contributors. However, most Kenyan studies have been conducted in urban tertiary facilities, limiting generalizability to rural settings.

The burden of diabetes in rural Kenya is increasing, with reported prevalence rates of 16 per cent in 2014 (Hemed, 2014) and 20 per cent in 2015 (Gikonyo, 2015). Rural populations often face unique barriers, including limited healthcare infrastructure, lower health literacy, insulin stock outs, high out-of-pocket costs, and limited access to diabetes education. Studies from rural Kitui and Bungoma counties (Mutua et al., 2022) highlight inadequate patient understanding of insulin therapy and limited time for provider-led education, both of which may amplify psychological resistance.

The consequences of delayed insulin initiation are profound. Chronic hyperglycaemia accelerates microvascular and microvascular complications, increasing morbidity, mortality, and healthcare costs. Landmark trials such as the Diabetes Control and Complications Trial (DCCT) and the Action to Control Cardiovascular Risk in Diabetes (ACCORD) study demonstrated that intensive glycaemia control

significantly reduces diabetes-related complications (DCCT Research Group, 1993; ACCORD Study Group, 2010). Despite this evidence, translation into routine practice remains inconsistent.

At the healthcare system level, clinical inertia further compounds the problem. Mwaniki et al. (2023), in a study at Embu Level 5 Hospital, found that only a minority of eligible patients were initiated on insulin despite clear indications. This dual challenge—patient-level psychological resistance and provider-level hesitancy—reinforces the pervasive impact of PIR in primary care settings.

Although evidence from urban referral hospitals suggests high levels of PIR in Kenya, limited data are available on its prevalence and associated psychological factors in rural healthcare facilities. This gap restricts context-specific intervention planning and undermines equitable diabetes care delivery. Rural populations remain underrepresented in national diabetes strategies despite differing sociocultural and resource-related realities.

Therefore, this study seeks to determine the prevalence of psychological insulin resistance among adults with type 2 diabetes mellitus attending PCEA Chogoria Hospital in rural Kenya and to examine its association with anxiety and depression. By providing rural-specific data, the study aims to inform targeted psychosocial and educational interventions that can improve insulin acceptance, reduce treatment delays, and enhance diabetes management outcomes in underserved populations.

2.0 LITERATURE REVIEW

Psychological Insulin Resistance

Psychological insulin resistance (PIR) is a well-documented phenomenon characterised by reluctance or refusal to initiate and adhere to insulin therapy, despite clear medical indications (Brod et al., 2008).PIR presents a critical barrier to optimal glycaemia control in patients with type 2 diabetes mellitus (T2DM), a condition that accounts for over 90 per cent of diabetes cases globally (International Diabetes Federation [IDF], 2023). A landmark cohort study involving 14,824 patients with T2DM demonstrated a mean delay of 7.7 years between the initiation of the last oral hypoglycaemia agent and the eventual commencement of insulin therapy, even though participants consistently maintained HbA1c levels above 8 per cent (Calvert et al., 2007).

This therapeutic inertia has profound consequences, as postponing treatment intensification increases the risk of microvascular and microvascular complications. The Diabetes Control and Complications Trial (DCCT, 1994) and the UK Prospective Diabetes Study (UKPDS, 1998) both demonstrated that early glycaemia control significantly reduces long-term complications of diabetes. Furthermore, delaying insulin initiation by a single year in individuals with HbA1c levels exceeding 7.5 per cent was associatedwitha64 per cent increased risk of fatal cardiovascular events (Paulet al., 2015).

The implications of PIR extend beyond physical outcomes, influencing psychosocial well-being and treatment satisfaction. Patients with PIR often report poorer adherence to self-care practices, including diet and exercise, leading to increased vulnerability to complications (Song, 2010). Additionally, PIR negatively impacts quality of life by fostering frustration, guilt, and anxiety among patients who view insulin therapy as a personal failure (Polonsky & Fisher, 2005). These findings emphasise the multifaceted burden of PIR, which operates at the intersection of psychological, cultural, and health system-related factors.

Globally, the prevalence of PIR varies widely, reflecting diverse sociocultural contexts and health system structures. In the UKPDS, approximately 27 per cent of participants randomised to insulin declined to initiate it (UKPDS, 1998). High prevalence rates have been reported in North Africa and sub-Saharan Africa: Libya documented PIR in 94.6 per cent of patients (Sabei & Sammud, 2015), South Africa reported 51.9 per cent (Ngassa et al., 2020), while 42.7 per cent was observed among patients in the Democratic Republic of Congo (Rita et al.,2019). Such findings suggest that PIR is not merely a Western phenomenon but a global challenge, particularly pronounced in resource-limited settings.

In East Africa, studies have similarly demonstrated high levels of PIR. In Kenya, Gulamet al. (2017) reported a striking prevalence of 83 per cent among patients attending the diabetes clinic at Kenyatta National Hospital (KNH). The predominant reason cited by patients was the perception of insulin initiation as an indicator of personal failure to manage the disease with oral agents. Stigma, fear of injections, and concerns about the permanence of insulin therapy also contributed significantly.

Complementing these findings, a more recent study at Lamu County Hospital highlighted similar barriers, where a lack of knowledge about insulin, cultural misconceptions, and inadequate counselling services amplified resistance (Abdulkadir et al., 2021). Adding further depth, a 2024 study in Nairobi's urban clinics revealed that 68 per cent of T2DM patients resisted insulin initiation due to misconceptions that it was a permanent, restrictive therapy that would curtail lifestyle flexibility (Manyara et al., 2024). Patients feared dependency and loss of autonomy, and these misconceptions were closely tied to insufficient counselling and health education. Uganda and Tanzania, though with limited data, provide further insight into regional trends. A study conducted in Uganda found that, while patients acknowledged the potential benefits of insulin, misconceptions about side effects, fear of dependency, and stigmas surrounding injections hindered acceptance (Kansiime et al., 2019).In Tanzania, qualitative reports from urban and peri-urban clinics suggest that resistance was frequently linked to healthcare provider hesitancy, reflecting a form of clinical inertia that intersects with PIR (Mosha et al., 2020). Taken together, these East African findings underscore that PIR in the region cannot be attributed solely to patient perceptions but is also influenced by systemic and provider-level barriers.

Several interrelated factors contribute to PIR. Patient-level factors include fear of hypoglycaemia, anticipated pain from injections, and concerns about lifestyle disruptions (Brod et al., 2008). Many patients experience insulin initiation with advanced or terminal disease, reinforcing the perception of failure (Gulam et al., 2017). In South Africa, for instance, Ngassa et al. (2020) found that inadequate diabetes knowledge was the most cited reason for resistance, while in Kenya, the sense of personal failure predominated. Cultural stigma around injections, where injectable therapy is equated with weakness or shame, also exacerbates reluctance.

Healthcare provider attitudes significantly influence PIR. Studies in Kenya (Mwaniki et al., 2023) and Tanzania (Mosha et al., 2020) revealed that provider hesitancy, driven by concerns about patient compliance, a lack of structured diabetes education programs, and fear of hypoglycaemia, delayed insulin initiation even when clinically indicated. Such provider-related inertia compounds patient reluctance and results in prolonged periods of poor glycaemia control.

EvidencesuggeststhattargetedinterventionscanmitigatePIR.Educationalinitiatives are particularly effective. A randomised controlled trial demonstrated that structured diabetes education improved insulin acceptance

by 20 per cent among older adults (Munshi et al., 2020). In low-resource contexts, community-based peer support groups have proven valuable in reducing PIR by addressing stigma and misinformation (Chew et al., 2022). In Kenya, the Base of the Pyramid Project, spearheaded by Novo Nordisk, successfully increased insulin uptake by enhancing affordability and incorporating patient-centred education programs (Novo Nordisk, 2019). These strategies not only reduced PIR but also improved continuity of care in underserved populations.

Similarly, in Uganda, peer-led education programs improved insulin initiation rates by fostering culturally appropriate dialogue about myths and fears surrounding insulin (Kansiime et al., 2019). Despite these successes, rural-focused interventions remain scarce. Most initiatives have been concentrated in urban referral centres, leaving rural patients, who often have limited access to specialised diabetes care, without adequate support.

Overall, PIR emerges as a global challenge, but East African studies highlight particularly acute barriers shaped by sociocultural beliefs, misinformation, and systemic limitations. The Kenyan context is especially concerning, with prevalence ratesashighas83 per cent at KNH (Gulamet al., 2017) and 68 per cent in Nairobi's urban clinics (Manyara et al., 2024). The Lamu study (Abdulkadir et al., 2021) further demonstrates how cultural misconceptions and weak health education persist even in semi-rural areas, suggesting that PIR is both an urban and a rural issue. Coupled with high rates of comorbid depression and anxiety (Otieno et al., 2017). These findings reveal a multi-layered problem that requires more than pharmacological solutions. This study at PCEA Chogoria Hospital in Tharaka -Nithi County, Kenya, aims to bridge rural data gaps by exploring PIR prevalence and its links to depression and anxiety, and to inform tailored interventions to enhance T2DM outcomes in underserved Kenyan populations.

Generalised Anxiety Disorder Scale (GAD-7)

Based on the symptoms described in the DSM-5, the GAD-7 scale is used to identify generalised anxiety disorder. It consists of seven questions, each of which is evaluated on a Likert scale from 0 to 3. Participants are questioned about how frequently in the two-week period they had experienced issues like anxiety, concern, or restlessness. The total score ranges from 0 to 21. Summated values between 5 and 9 denote mild symptoms, summated ratings between 10 and 14 denote moderate symptoms, and summated scores beyond 15 denote severe symptoms. A Swahili-validated version with a Cronbach's alpha of 0.82 was developed among HIV patients. (Nyongesa et al., 2020). Among senior citizens, the tool has been shown to be efficient. (Wild et al., 2014).

The Insulin Treatment Appraisal Scale (ITAS)

Snoek et al. devised the ITA Stool in 2007. During development, they included 282 type-2 diabetic patients who were either insulin-naïve or treated. With a Cronbach alpha of 0.89, the scores demonstrated strong internal validity. The 20-item ITAS is self-administered and intended to gauge patients' feelings about receiving insulin therapy. On a 5-point Likert scale, the scale is composed of 16 negatively expressed items and 4 positive items. The sum of the inverted positive (4–20) and negative (16–80) ITAS values yields the total ITAS score, which ranges from 20 to 100. A score below 65 denotes a more positive attitude, whereas a score above 65 denotes a negative attitude. A validated Swahili version of the ITAS tool has been used in a separate study at Kenyatta National Hospital. (Gulam, 2017)

Barriers to Insulin Treatment Questionnaire (BITQ) Scores

This was a tool developed by (Petrak et al., 2007). It was developed among 897 participants in Germany. The participants involved in the development of this questionnaire were insulin-naïve patients. The 14 items and five subscales of the BITQ tool measure anxiety linked to insulin injections and self-testing, expectations of effective insulin-related outcomes, expected problems with insulin treatment, stigmatisation brought on by insulin injection, and anxiety related to hypoglycaemia. It had a Cronbach's alpha of 0.78 for internal dependability. The BITQ tool does not fit this study population because this study will cover individuals on dietary, oral, and insulin therapy.

Chinese Attitudes to Starting Insulin Questionnaire (Ch-ASIQ)

This is a 13-point tool developed by Fu et al., in 2013. It was developed among 300 participants. The tool specifically addressed psychological insulin resistance among elderly patients. It had an internal reliability of Cronbach alpha 0.725 (Fu et al., 2013). Given that this tool was validated among Chinese patients, less educated and elderly patients, it may not reflect the study participants.

Theoretical Framework

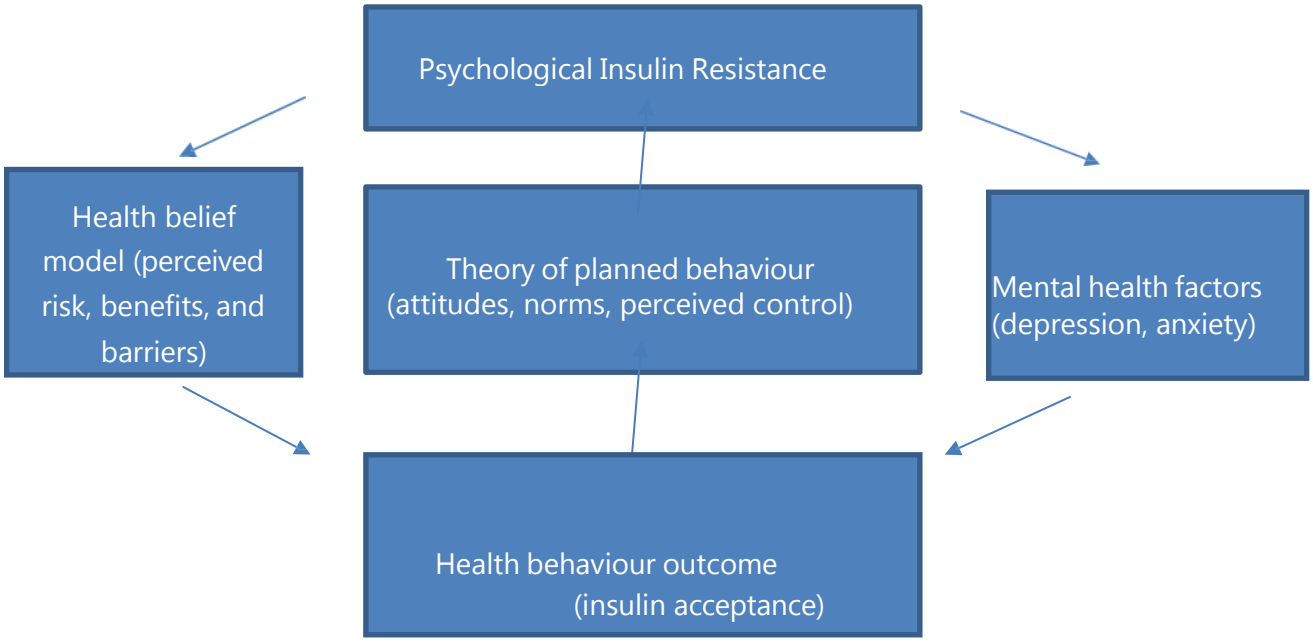

Figure 1: Theoretical Framework

This integrated model combines the Health Belief Model (HBM), Theory of Planned Behaviour (TPB), and mental health constructs to explain psychological insulin resistance (PIR) among patients with type 2 diabetes. PIR arises when a patient delays or refuses to initiate insulin therapy despite a medical indication. The HBM component addresses patients' beliefs about their condition—specifically their perceived susceptibility to complications, perceived severity of diabetes, perceived benefits of insulin, and perceived barriers such as fear of injections or cost. These beliefs form the cognitive foundation of PIR. The TPB component adds a behavioural lens, focusing on how attitudes toward insulin (e.g., viewing it as a last resort), subjective norms (e.g., stigma or family influence), and perceived behavioural control (e.g.,

confidence in self-injection) shape a patient's intention to initiate insulin therapy. Together, these psychological and social factors determine the likelihood of insulin uptake.

Mental health factors such as depression and anxiety act as cross-cutting modifiers. They distort perception, reduce self-efficacy, and exacerbate fears or indecision. These emotional states can strengthen resistance, even when cognitive and social factors are favourable. The intersection of these domains ultimately influences health behaviour, particularly insulin acceptance or refusal. This integrated model uses the Health Belief Model (HBM), Theory of Planned Behaviour (TPB), and mental health constructs to explain PIR. The HBM addresses beliefs about diabetes severity and the benefits of insulin, while the TPB focuses on attitudes, norms, and perceived control. Depression and anxiety distort these perceptions, reducing self-efficacy and amplifying resistance, particularly in rural Kenya, where mental health and diabetes care gaps persist.

3.0 METHODOLOGY

This study employed a descriptive cross-sectional research design. This design was chosen for its efficiency in estimating the prevalence of PIR, previously reported at 83 per cent in urban Kenya (Gulam et al., 2017). The cross-sectional approach suits the study's objectives of generating baseline data on PIR in a rural population, where such data are scarce, and of informing targeted interventions to improve insulin therapy acceptance. By capturing concurrent PIR data, this design enables the identification of psychological barriers to diabetes management, aligning with the need for context-specific evidence to support equitable care in rural Kenya. The study was conducted at PCEA Chogoria Hospital, located in Tharaka-Nithi County. Participants were sampled from the diabetic clinic.

The county's general population as of the 2019 population and housing census is 393,177. Chogoria Hospital serves a catchment area of about 3000 km2 with 36,130 households as per the 2019 census. Tharaka- Nithi is among the counties with the highest burden of non-communicable diseases in the country. Mortalities due to NCDs in Tharaka-Nithi County are estimated to be above 45 per cent (NCD Strategic Plan, MOH, 2019). This makes it among the top ten counties in Kenya with the highest burden of non-communicable diseases. The study was carried out among patients diagnosed with diabetes and in follow-up at the Chogoria Hospital Diabetic Clinic.

Inclusion Criteria

A person who had clinically diagnosed type 2 diabetes for more than six months. The patient was on dietary therapy, oral medications, or insulin therapy, aged 18 to 80 years. Ability to read and understand English or Swahili

Exclusion Criteria

Patients with cognitive impairment and other major life-threatening diseases. Patients hospitalised within the preceding two weeks. This is because GAD-7 and PHQ-9 assess symptoms over the preceding 2 weeks, which could be a confounder.

Sample size

Based on the Cochran (1977) formula, the sample size was approximated. $n\ 0 = z^2 pq$ e^2 for infinite population (Cochran, 1977)

Where: n 0 is the necessary sample size,
z is the proposed critical value of chosen confidence level (taken as 1.96 at 95% CI)
p is a projected proportion of a characteristic that the population possesses. (I.e. prevalence of the desired attribute – in this case PIR in type II diabetes patients – no known rural prevalence, hence prevalence taken as 0.5.
q = 1– p
e is the desired level of precision – i.e. Margin of error (taken as 0.05)

Thus, $n^0 = \frac{1.96^2 * 0.5 * (1 - 0.5)}{0.05^2} = 384$

Since the population is finite (less than 10,000), the correction formula (Cochran, 1977) was applied as indicated.

$$no = \frac{z^2 pq}{e^2}$$

for infinite population (Cochran, 1977)
Where:
n0 is the required sample size,
z is the selected critical value of desired confidence level (taken as 1.96 at 95% CI)
p is the estimated proportion of an attribute that is present in the population (prevalence of the desired attribute – in this case psychological insulin resistance among type II diabetes patients taken as 0.8 from the estimated prevalence by Gulam et al., 2017).
q = 1– p

e is the desired level of precision – i.e. Margin of error (taken as 0.05)

$$n^0 = \frac{1.96^2 * 0.5 * (1 - 0.5)}{0.05^2}$$

Thus,

$$\frac{n^0}{\frac{(n^0 - 1)}{N}}$$

Since the population is finite (less than 10,000), apply sample size correction formula (Cochran, 1977)

Where:
n0 is the sample size when the population is infinite (i.e. 245.86)
N is the population size (180 is the average number of patients attending clinic in a particular month).

$$\frac{384}{\frac{(384-1)}{180}}$$

Thus, the sample size will be 123

Sampling Process

A convenient sampling technique was employed in this study by recruiting diabetic patients attending the daily DM clinic. All potential respondents were screened for eligibility. This was repeated till the desired sample size was attained. While this sampling technique is practical and cost-effective, it introduces several limitations that may affect the generalizability of the findings. First, participants were recruited based on their availability and willingness to participate rather than through randomisation, increasing the risk of selection bias. This may have led to overrepresentation of individuals who are more engaged in their care, more accessible within clinic settings, or more open to discussing psychosocial issues, such as insulin resistance, depression, and anxiety.

Data Collection Tools

This study utilised a datasheet, the Generalised Anxiety Disorder-7 (GAD-7) scale, the Insulin Treatment Appraisal Scale (ITAS), and the Patient Health Questionnaire-9 (PHQ-9). The data sheet included age, gender, medication type, how long one has lived with diabetes and used insulin, mode of purchasing insulin, HBA1c level, and ongoing mental health treatment. The information needed was gathered from the data sheet, either provided by the patients themselves or retrieved from their electronic medical records. GAD-7, ITAS and PHQ- 9 tools have demonstrated good internal reliability with Cronbach's alpha values of 0.82, 0.89, and 0.89, respectively (Nyongesa et al., 2020, Snoek et al., 2007; Spitzer et al., 1999).

Data Collection Procedures

Patients attending the diabetes clinic were identified for participation upon registration. They were introduced to the Principal Investigator or the assistants by the nurse taking vital signs. The principal investigator or assistants took the identified patients, one at a time, to one of the consultation rooms, which was designated for interviews and to provide privacy. The principal investigator or the assistants introduced themselves, explained the study and its objectives, and asked the patients to volunteer to participate. If the patient was eligible to participate and had agreed to participate, he/she provided written consent by signing the consent form. The principal investigator or the research assistants administered the structured questionnaire, a standard, validated tool called the Insulin Treatment Appraisal Scale (ITAS), a data sheet, PHQ-9, and GAD-7. Medical information was also retrieved from the electronic medical records. Medical records also helped correlate participants' information to minimise recall bias. A sticker was placed on the patients' diabetic cards, and the daily log of enrolled patient unique numbers was kept to cross-check during subsequent interviews to avoid duplicate enrolment.

Data Management and Analysis

These details are implemented to ensure data integrity, participant protection, and systematic monitoring of study activities:

Adverse Event Reporting-With regard to adverse events, none were observed or reported over the course of data collection. Participants were informed that any discomfort or concerns arising during the interviews could be communicated directly to the triage nurse or to the principal investigator for prompt attention. Any events arising were to be reported by the lead researcher and notify hospital management.

Data collected during the study were entered into computerised data entry sheets available only to the PI and research assistants. The data did not include the names of the participants.

Quality Assurance: The Principal Investigator (PI) and the assistants ensured the collected data were of high quality by checking the questionnaire immediately after each interview, before the study participant left the hospital.

Any missing or unclear responses to the questions were to be corrected by requesting that the patient provide additional time to clarify the responses.

Confidentiality: Data collection was carried out in designated private rooms to ensure participant comfort and privacy. All information obtained from respondents was anonymised, and strict confidentiality was maintained throughout the study. The data were used exclusively for the purposes outlined in the study protocol. No invasive procedures were undertaken, and participants were not subjected to any additional financial costs as a result of their involvement.

Ethical Considerations

Ethical approval to undertake this study was obtained from the Kabarak University Research Ethics Committee (KUREC), reference number KUREC-050824, and further authorisation was granted by Chogoria Hospital management via a formal email confirmation. In addition, a research permit was secured from the National Commission for Science, Technology and Innovation (NACOSTI) under license number NACOSTI/P/24/414487.

Prior to enrolment, the investigators provided potential participants with a clear explanation of the study objectives, procedures, and their rights as research subjects. Written informed consent was subsequently obtained, either by signature or thumbprint, for participants who were unable to sign. To ensure privacy and confidentiality, interviews were conducted in a secure setting, and no personal identifiers, such as names or hospital numbers, were recorded on the questionnaires. Participation in the study was strictly voluntary, and participants retained the right to withdraw at any stage without penalty or need for justification.

Special ethical considerations were applied for participants who screened positive for moderate to severe levels of depression or anxiety. In such cases, additional informed consent was obtained to disclose this information to their primary healthcare provider, with the aim of facilitating timely clinical management and support. Data collection for the study was conducted in December 2024.

4.0 FINDINGSAND DISCUSSION

Demographic Information

Table 1: Age of the Respondents

Frequency	Percent	
26-35	1	.8
36-46	3	2.5
46-55	26	21.5
Above 55	91	75.2
Total	121	100.0

The study findings in Table 1 indicate that the majority of respondents (75.2%) were 55 years of age or older, while the least were between 26 and 35 years of age.

Table 2: Sex of the Respondents

Frequency	Percent	
F	67	55.4
M	54	44.6
Total	121	100.0

The study findings in Table 2 indicate that the study was not gender-biased, as both genders were given equal opportunities to participate; however, the majority of respondents were female (55.4 per cent).

Table 3: Duration of Diabetes in Years

Years	Frequency	Percent
0-4.9	52	43
5-9.9	31	26
10-14.9	20	17
15-19.9	7	6
>20	11	9
	121	100

The findings in Table 3 show that a substantial proportion of respondents (43%) had lived with diabetes for less than five years, while (9%) had a disease duration exceeding twenty years. This distribution suggests a

mixed cohort of newly diagnosed and long-term patients, which may influence attitudes toward insulin initiation. Individuals with shorter disease duration may perceive insulin as premature, whereas those with longer duration may experience treatment fatigue or entrenched beliefs about disease progression, potentially contributing to psychological insulin resistance (PIR).

Table 4: Medication Type

	Frequency		**Percent**
Valid	Orals	83	68.6
	Orals + Insulin	36	29.8
	Diet	1	.8
	Insulin	1	.8
	Total	121	100.0

The study findings in Table 4 indicate that the majority of respondents take oral pills (68.6 per cent), followed by those taking oral + insulin (29.8 per cent), while the least take diet and insulin (less than 2 per cent).

Table 5: Payment Method

		Frequency	**Percent**
Valid	NHIF	40	33.1
	NHIF+POCKET	64	52.9
	POCKET	14	11.6
	INSURANCE	2	1.7
	NHIF + INSURANCE	1	.8
	Total	121	100.0

The majority of respondents use NHIF + Pocket (52.9 per cent), followed by NHIF (33.1 per cent), while the least used payment method is NHIF + Insurance at less than 1 per cent.

The Prevalence of PIR among type 2DM Patients Attending PCEA Chogoria Hospital, PIR Based on Gender

Table 6: Sex * HBA1C2 Cross Tabulation

HBA1C2									
<5			5.0 - 6.0	6.1 - 7.0	7.1 - 8.0	8.1 -9	>10	9-10	Total
Sex	F	1	16	12	12	12	10	4	67
	M	2	9	5	8	19	9	2	54
Total		3	25	17	20	31	19	6	121

The analysis of glycaemia control by gender among type 2 diabetes patients at PCEA Chogoria Hospital reveals distinct patterns in diabetes management between male and female patients. Female patients demonstrated relatively better glycaemia control, with 43.3 per cent (29 out of 67) achieving HbA1c levels below 7.0 per cent, which is generally considered the threshold for good control. Within this group, 41.8 per cent of participants had good control of their sugars.TheyexhibitedHba1cof<7 per cent.

However, a significant proportion of female patients (37.3%) still exhibited suboptimal control, with HbA1c levels exceeding 7.1 per cent, including 10 patients (14.9%) with dangerously high levels above 10 per cent. In contrast, male patients displayed poorer glycaemic control overall. Only 29.6 per cent (16 out of54) had HbA1c levelsbelow7.0 per cent, with just 9 patients (16.7%) in the pre-diabetic range (5.0–6.0%) and (5.0-9.3%) near the target range (6.1–7.0%).Notably, more than half of the male patients (53.7%) had HbA1c levels of (8.1%) or higher, indicating inadequate control. This included 19 patients (35.2%) in the (8.1–9.0%) range and (9 -16.7%) with levels exceeding 10 per cent, highlighting a critical need for intervention. The data also revealed a small subset of patients with very low HbA1c levels (<5.0%), which may suggest potential over-treatment. This was observed in 1 female (1.5%) and 2 male (3.7%) patients, warranting further clinical review to avoid risks associated with excessively tight glycaemic control, such as hypoglycaemia. These findings underscore significant gender disparities in diabetes management, with male patients facing greater challenges in achieving optimal glycaemic control. Possible contributing factors could include differences in medication adherence, lifestyle behaviours, or biological responses to treatment. The results emphasise the need for targeted interventions, particularly for male patients, to improve diabetes outcomes. Strategies such as enhanced education, personalised treatment plans, and regular monitoring could help address disparities and reduce the risk of complications associated with poorly controlled diabetes.

These gender-based differences in glycaemic control may have implications for psychological insulin resistance, as poorer metabolic control—particularly among male patients—could interact with perceptions of treatment failure, health-seeking behaviour patterns, and acceptance of treatment intensification.

Table 7: Average Blood Sugar Levels (HBA1c)

Frequency	Percent	
<5	3	2.5
5.0-6.0	25	20.7
6.1-7.0	17	14.0
7.1-8.0	20	16.5
8.1-9.0	31	25.6
9.1-10.0	6	5
>10	19	15.7
Total	121	100.0

The study findings revealed significant variations in glycaemia control among type 2 diabetes patients attending PCEA Chogoria Hospital. The HbA1c results showed that only 37.2 per cent of patients achieved good glycaemia control (HbA1c <7.0%), with only 2.5 per cent demonstrating tight control (HbA1c <

5.0%). The majority of patients (62.8%) exhibited suboptimal to poor control, including42.1 per cent with HbA1c levels between 7.1-9.0 per cent and a concerning 20.7 per cent with dangerously high levels above 9.0 per cent. The distribution pattern indicated that the largest single group (25.6%) fell within the 8.1-9.0 per cent range, suggesting many patients were approaching but not reaching target control levels. These results highlight a critical need for improved diabetes management strategies, particularly for the substantial proportion of patients with HbA1c levels exceeding 7.1 per cent, who may require treatment intensification to reduce their risk of diabetes-related complications.

The findings underscore the importance of evaluating and potentially enhancing current diabetes care protocols at the facility to better support patients in achieving optimal glycaemic control.

Table 8: The Relationship between HBA1C and PIR in Patients with Type II Diabetes

		Value of HBA1c						
		<5	5.0-60	6.1-70	7.1-8.0	8.1-10.0	>10	Total
PIR2	Below 65	16	1	4	2	6	14	43
	Neutral	0	1	0	0	0	0	1
	Above 65	36	5	5	5	9	17	77
Total		52	7	9	7	15	31	121

The study findings in Table 8 give the relationship between Average Blood Sugar Levels (HBA1c) and the PIR among type 2 DM patients. A majority of participants had an HbA1c of more than 7 (63 per cent), with nearly 1 in 4 having an HbA1c of more than 10 mmol/L. On examining the relationship between HbA1c and PIR using the chi-square and Fisher's exact test, there was no significant relationship.

Table 9: Relationship between HBA1c and PIR using Chi Square and Fischer's Exact Test

Test	Statistic	P-value	Interpretation
Fischer's exact test	Odds ratio=0.63	0.254	No significant association
Likelihood Ratio test	G= 1.46	0.226	No significant association
Chi- square test	χ^2= 1.47	0.226	No significant association

The statistical analysis in Table 9 demonstrates no significant association between HbA1c levels and psychological insulin resistance ($p > 0.05$ across all tests). This suggests that insulin resistance in this population may not be directly related to objective glycaemic control but rather to psychological, cultural, or informational factors. Even patients with poor glycaemic control did not necessarily exhibit higher PIR, reinforcing the importance of addressing attitudinal and emotional barriers alongside clinical indicators.

Table 10: Classification of Patients for PIR based on ITAS score

	Frequency	Percent
Below 65	43	35.5
Above 65	76	62.8
Neutral	2	1.7
Total	121	100.0

Scores are summed and standardised to a 0–100 scale, with higher scores indicating greater emotional distress. Using a score of 65 as the base value, the respondents recorded a negative score of 62.8 per cent, with the ITAS sum of 65 and above based on the ITA Stool used. The Prevalence of PIR among type2DMpatientsattendingPCEAChogoriaHospitalisthereforegivenas62.8 per cent as in Table 10.

Discussion

Prevalence of Psychological Insulin Resistance and Patient Demographics

The prevalence of psychological insulin resistance (PIR) in this study was 62.8 per cent, a significant proportion that reflects the magnitude of attitudinal and psychological barriers to insulin therapy among patients with type 2 diabetes mellitus (T2DM) in a rural Kenyan setting. This finding underscores the reality that, despite medical advancements and the increasing availability of insulin, patient-level resistance to its initiation remains a major obstacle in diabetes care. The prevalence recorded in this study aligns with broader global and regional trends, though it is slightly lower than some previously reported figures in other African studies.

Comparatively, the most cited Kenyan study by Gulam et al. (2017), conducted at Kenyatta National Hospital, a major urban referral centre, and reported a notably higher PIR prevalence of 82.6 per cent among insulin-naïve patients. This difference highlights the influence of care settings and population profiles on PIR. In Gulam's urban cohort, patients were exposed to more specialised care, often with more advanced disease, and PIR was shaped by the perception that insulin marked failure or end- stage disease. Our rural population, while still demonstrating considerable resistance, may be less medicalised and more influenced by factors such as economic constraints and limited education about the progression of diabetes.

Demographically, most of the study participants were older adults, with 75.2 per cent aged 55 years or older. This aligns with broader regional trends showing increased T2DM prevalence among the elderly in sub-Saharan Africa (Ngassa et al., 2020). Additionally, the study had a slight female majority(55.4%),consistent with literature indicating higher diabetes burden among women in Africa, potentially due to gender roles affecting healthcare access and chronic disease self-management.(Ngassa et al., 2020).

Perceptions and Attitudes toward Insulin Therapy

Patient beliefs and emotional responses toward insulin significantly influence PIR. This study found that 77 per cent of participants felt starting insulin indicated personal failure in diabetes management. This belief, prominent in both rural and urban populations, resonates with Gulam et al. (2017), who also identified guilt and self-blame as key drivers of PIR. Patients often perceive insulin not as a proactive treatment step but as a symbol of deterioration or poor self-discipline. Fear of injections was another strong theme, with over 58 per cent of participants citing fear of needles or pain. Such fears are well documented in African and global literature. In a Nigerian study, Chen et al. (2020) reported similar concerns, especially among older patients. In rural environments characterised by resource limitations, this apprehension may be exacerbated by the absence of guidance from qualified diabetes educators who can demonstrate appropriate injection technique or provide reassurance to patients. A notable proportion of patients (54%) believed that insulin would reduce their quality of life or daily flexibility. This belief is reinforced by rigid routines required for insulin administration and the additional burden of glucose monitoring. In studies from rural South Africa and Ethiopia, similar concerns about lifestyle disruption and dependency were

associated with delayed insulin initiation (Gebremedhin et al., 2021). Additionally, some patients expressed concern that insulin could lead to dependence on healthcare services, which in rural areas may be irregular or inaccessible due to transportation or cost constraints. Despite these fears, the study also found positive attitudes. Approximately 65 per cent of respondents acknowledged insulin's effectiveness in preventing complications. This dichotomy reflects a cognitive dissonance observed in previous literature— patients often intellectually understand the benefits of insulin but remain emotionally resistant. Targeted, culturally sensitive education can help reconcile these opposing beliefs by reframing insulin not as a "last resort" but as an effective early intervention.

5.0 CONCLUSION AND RECOMMENDATIONS

Conclusion: This study reinforces the complexity of psychological insulin resistance among patientswithtype2diabetes.PIRisinfluencedmorebybeliefs, stigma, emotional factors, and practical concerns than by glycaemic control alone.

Recommendations: Future research should focus on longitudinal interventions to reduce PIR and improve mental and physical outcomes in diabetic populations.

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