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Assessing the experiences and knowledge of gestational diabetes mellitus among gestational diabetic mellitus patients who are post-delivery at Chris Hani Baragwanath Academic Hospital

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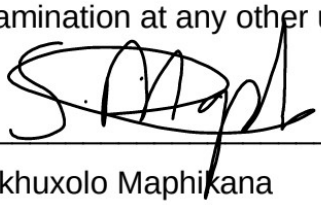
ASSESSING THE EXPERIENCES AND KNOWLEDGE OF GESTATIONAL DIABETES MELLITUS AMONG GESTATIONAL DIABETIC MELLITUS PATIENTS WHO ARE POST-DELIVERY AT CHRIS HANI BARAGWANATH ACADEMIC HOSPITAL

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A research report submitted to the Faculty of Health Sciences, University of the Witwatersrand, Johannesburg, in partial fulfilment of the requirements for the degree of Masters in Medicine (MMed)

DECLARATION

I, **Sakhuxolo Maphikana**, declare that this research report is my own, unaided work. It is being submitted for the Degree of Masters in Medicine (MMed) at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination at any other university.



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Sakhuxolo Maphikana

26 September 2022

Johannesburg

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PUBLICATIONS AND PRESENTATIONS

This work has never been published.

It has never been presented at a congress.

ABSTRACT

INTRODUCTION

The increasing prevalence of gestational diabetes mellitus (GDM) can be deemed as a concern for healthcare practitioners in South Africa, due to poor pregnancy outcomes, and the increased burden on the healthcare system. There are few studies that have investigated the knowledge and experiences of GDM among women in Africa, and in South Africa. This descriptive cross-sectional study aimed to evaluate the knowledge and experiences of GDM, among women with GDM post-delivery, at Chris Hani Baragwanath Academic Hospital (CHBAH).

METHOD:

After delivery at CHBAH, participants diagnosed with GDM responded to a questionnaire to assess their knowledge and their experiences of GDM.

RESULTS:

30 participants were recruited and the findings indicate that the majority of women surveyed had adequate knowledge about the risk factors, diagnosis and the maternal and foetal effects of GDM. Four themes were generated from the participants' experiences of GDM: negative emotions experienced by the women, the opportunity to improve lifestyle or health, concern for own and baby's health and adapting to the GDM diagnosis.

CONCLUSION:

The study provides insight into the knowledge and the experiences of GDM among South African women at CHBAH, who had a pregnancy that was complicated by GDM. Education levels were found to have an impact on knowledge assimilation and the role of health professionals in GDM management was emphasised. Despite some negative experiences of GDM diagnosis and management, healthcare workers contributed positively to the overall pregnancy experience. It has provided valuable information for improving management of GDM and opportunities for further local studies.

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LIST OF ABBREVIATIONS

BMI	Body Mass Index
CHBAH	Chris Hani Baragwanath Academic Hospital
DM	Diabetes Mellitus
GDM	Gestational Diabetes Mellitus
GDM	Gestational Diabetes Mellitus
HIC	High Income Country
IDF	International Diabetes Federation
LMIC	Low and/or Middle-Income Countries
SSA	Sub-Saharan Africa
T2DM	Type 2 Diabetes Mellitus

1. INTRODUCTION

1.1 BACKGROUND

Estimates from 2021 by the International Diabetes Federation (IDF) indicate that there are 536.6 million people (ages 20–79 years old) that are living with diabetes and this number is projected to increase to 783.2 million adults by 2045 (1). The African continent, specifically Sub-Saharan Africa, is projected to see the most significant "relative increase in numbers of people with diabetes" (1).

Concurrently, the prevalence of diabetes during pregnancy is on the rise worldwide, with gestational diabetes with the larger burden and the remainder being pregestational diabetes (2). According to the World Health Organization (WHO) gestational diabetes mellitus (GDM) can be described as "any degree of glucose intolerance with onset, or first recognised during pregnancy" (3). The risk factors for developing GDM include: previous GDM, foetal macrosomia, pregnancy-induced hypertension, polycystic ovarian syndrome, family history of diabetes, and obesity (4).

In 2015, the prevalence of gestational diabetes mellitus was 5.4% in Europe, 11.5% in Asia, 14% in sub-Saharan Africa and North Africa, and in the Middle East with a range between 8.4% and 24.5% (5,6). This variation in prevalence across the regions was dependent on differences between the demographics, screening methods, and diagnostic criteria in each region (6).

A systemic review published in 2014 by Kanguru et al., while reporting a notable GDM prevalence of 6.45% in Nigerian parturients, highlighted the dearth of GDM prevalence studies in low-income countries, particularly African countries, for which there are insufficient data on GDM prevalence (4). In 2018 the South African prevalence of GDM was reported at 9.1% by Macauley et al. (7). In addition to the limited data on GDM prevalence in Africa, there are very few studies that have investigated the knowledge and experiences of GDM among women in Africa, and in South Africa.

2. LITERATURE REVIEW

This chapter discusses the risks factors for GDM, the maternal and foetal effects of GDM and explores the existing literature on the knowledge and experiences of women with GDM.

2.1 GESTATIONAL DIABETES MELLITUS RISK FACTORS

GDM is diabetes mellitus, i.e., “glucose intolerance resulting in hyperglycaemia” that is diagnosed for the first time during pregnancy, and may vary in severity (8). The so called “traditional” risk factors associated with GDM are: obesity (pre-pregnancy weight ≥ 90kg), maternal obesity (BMI ≥ 30kg/m^2), first degree relation with Type 2 diabetes mellitus (T2DM) or family history of T2DM, maternal history of GDM, previous macrosomic neonate (birth weight ≥ 4500g) and large for gestational age (LGA) foetus (9,10,11|). Other risk factors include, but are not limited to: previous adverse pregnancy outcomes advanced maternal age (≥ 35 years old), glycosuria, polyhydramnios in current pregnancy and ethnicity (5,12).

2.2 MATERNAL AND FOETAL EFFECTS

There are numerous obstetric complications associated with GDM. The more common complications are pre-eclampsia, premature labour, polyhydramnios, necessitation of caesarean section and operative delivery (13). Foetal effects may range from early miscarriage to term stillbirth (14). Birthing difficulties such as shoulder dystocia may occur secondary to foetal macrosomia (13). Women who develop GDM are also more likely to have a new diagnosis of a mood or anxiety disorder during pregnancy or within one year of delivery (15).

Healthcare professionals should be aware that receiving a diagnosis of GDM increases women's anxiety about the health of their baby and their own health during pregnancy and after delivery (16). GDM may also have a negative impact on women’s mental well-being, functioning and quality of life (17).

2.3 KNOWLEDGE OF GESTATIONAL DIABETES MELLITUS AMONG PREGNANT WOMEN

Knowledge is one of the vital elements required for effective health literacy. Insufficient knowledge about a disease has been found to result in result in an inadequate understanding of the medical information required to support patient adherence to the management strategies that are required to produce favourable outcomes (18).

A Ghanaian study found that healthcare workers, radios, newspapers, and televisions are the major sources of GDM knowledge in the general population (19). A Saudi Arabian study recommended mass media campaigns to raise awareness and increase knowledge about GDM (20). This study found that most of the participants had limited knowledge, particularly about GDM diagnosis, despite a high prevalence of GDM in the country (20).

A 2020 systematic review conducted by Craig et al. reviewed 41 studies on the experiences of women with GDM (21). They found that across these studies women had varying levels of knowledge about what GDM was and how it comes about (21). The review also found that the level of knowledge about GDM was a critical aspect of the women's ability to "process and accept" the diagnosis of GDM (21). This is consistent with a Ugandan study that posited that the feelings of fear and anxiety experienced after a GDM diagnosis are due in part to lack of knowledge and understanding about the implications of the diagnosis (22).

A UK study that assessed the knowledge of women post-delivery found that many felt that they had a good understanding of GDM but further enquiry revealed that they had several misconceptions about GDM (23). These misconceptions were related to GDM aetiology, as well as the GDM diagnosis, which led to some participants questioning the validity of their GDM diagnosis (23). In another study women expressed their confusion and lack of knowledge about GDM, including a limited understanding of the importance of blood glucose control and dietary self-management (24).

2.3.1 Factors influencing knowledge about GDM

An Indian study found that there was a huge gap between rural and urban patients when it comes to knowledge of GDM (18). This gap was attributed to higher levels of education among urban patients (18). It has also been noted that employed women have more knowledge about GDM compared to unemployed women (25). In Saudi Arabia, researchers found that women's knowledge about the effects of GDM included: level of education, nationality, number of pregnancies, previous GDM diagnosis and current chronic hypertension (26). These factors were found to correspond to an Indian study, which showed that knowledge about GDM was influenced by "maternal age, educational status, religion, and occupation" of the mother (27).

2.3.2 Knowledge about maternal and foetal effects of GDM

Knowledge about maternal and foetal effects of GDM has been found to be poor.
Craig et al. found that knowledge about the foetal effects of GDM was limited and some women had thoroughly incorrect understandings about the aetiology of the condition (21). A 2019 study by Amina Abdo Salhi et al. showed that about 71.3% of the participants believed that GDM did not affect mothers and 65.2% of the participants believed that GDM had no effect on neonates (26).

2.3.3 Outcomes related to knowledge about GDM

An African systematic review identified that one of the significant patient-related barriers to screening, diagnosis and management of GDM, on the African continent, is insufficient knowledge about GDM (28). A Malaysian study showed that higher knowledge about GDM is related to improved glycaemic control in GDM patients (29). While low health literacy, regarding GDM is associated with poorer glycaemic control (30). Given the self-management demands of contemporary diabetes care involves, individuals with inadequate knowledge are likely to be ill-prepared and have insufficient support to care for their condition (31).

Regarding the psychosocial impact of GDM knowledge, a South African study found that a lack of knowledge caused anxiety among women diagnosed with GDM, and they

cited feeling “disempowered by their lack of knowledge” (17). Their anxiety was exacerbated by not receiving adequate information or education about GDM from their healthcare providers, and were not able to receive answers to all the questions that they had after diagnosis (17). This highlights the critical role that healthcare providers play in providing comprehensive information and education on a condition, in order to support patients in the diagnosis and management thereof.

2.4 EXPERIENCES OF GESTATIONAL DIABETES MELLITUS AMONG PREGNANT WOMEN

A significant number of studies have been conducted on the experiences of women in high-income countries that have been diagnosed with GDM, but very few have investigated the experiences of women in low and middle-income countries (LMICs) (22). There are even fewer studies that have explored the experiences of women with GDM in Africa. In recent years there are a handful of studies that include the experiences of women with GDM (although some are not wholly focused on the experiences of GDM) in South Africa, Ghana, and Uganda(17,32,19,22).

2.4.1 Experiences of GDM diagnosis

A Ugandan study examined women’s reactions to a GDM diagnosis (22). The main finding of this study was that women felt “fearful and anxious” after receiving their GDM diagnosis, with concerns about the condition being “life-threatening” (22). This finding was consistent with a systematic review conducted by Craig et al which reviewed 41 studies on the experiences of women with GDM (21). Of these 41 studies, only two were from LMICs and there were no studies from Africa, although some studies included women of African descent living in Europe and the United States (21).

Among the eight themes identified from the studies reviewed by Craig et al. was the “initial psychological impact” of the GDM diagnosis, wherein women indicated feeling “self-blame, failure, fear, sadness, concern and confusion” (21).

Devsam et al. conducted an interpretive review study in 2012 on the experiences of

women with GDM (33). Regarding the initial reaction to a GDM diagnosis, women reported negative thoughts following the diagnosis and expressed feeling "'shocked', 'upset', 'panicked', 'scared', 'numbed', 'depressed', 'fearful', 'terrified', 'disappointed', 'surprised', 'horribly sad', 'anxious' and 'worried'" (33).

An early study by Lawson and Rajaram found that women felt "fear, anxiety and depression" after a GDM diagnosis with initial concerns primarily about the health of the baby (34). For some women the intense emotions persisted for weeks. For many of the women the diagnosis was unexpected because they had a non-problematic pregnancy until being diagnosed via screening, and this made the diagnosis difficult to accept (34). After learning about the long-term effects of GDM, women felt despair towards their future and worried about what would happen later in life, if they developed T2DM (34).

A study done in 2018 by Parsons et al. also found that women reported feeling emotionally disturbed because they blamed themselves for developing GDM, while some stated that if their babies were affected by their GDM they would never forgive themselves (35).

2.4.2 Experiences of living with and managing GDM

Parsons et al., identified seven main themes namely "disrupted pregnancy, projected anxiety, reproductive asceticism, women as baby machines, perceived stigma, lack of shared understanding, and postpartum abandonment" indicating that the overall experiences of GDM may be negative (35).

According to Parsons et al. many women experience overwhelm and stress related to the immediate changes that are required to manage GDM, particularly with their diet, and starting on medication (35). The diagnosis of GDM, comes as a shock to many women and it is anxiety-inducing to adjust to the intensive number of antenatal visits that are increased to monitor their GDM (35). Self-glucose monitoring was also cited as being strenuous by some women , although others adjusted well to glucose monitoring (35).

Hjelm et al found that women's experiences of managing their GDM and following their prescribed regime was described as "'challenging', 'hard work', 'a struggle', 'very stressful', and 'difficult'" 36). Morrison et al. found that women reported difficulties with dietary management, while others felt anxious anxiety when they had to inject themselves with insulin (37).

However, some positive themes that emerged from research done by Morrison et al were: "an opportunity to improve one's lifestyle, adapting to life with GDM, better awareness, staying healthy, and preventing diabetes" (37). While many women were consumed by the stress that comes with the diagnosis of GDM, some saw their diagnosis as an opportunity to improve their lifestyle (37). Many women also cited knowing that they had been needing to reassess their nutrition and physical activity (37). With adequate knowledge and the tools required to self-manage their GDM, some women reported being able to adapt easily to living with GDM, e.g. having positive feelings abo about self-injecting with insulin because they were aware that it improves glucose control (37). Morrison et al. also found that women were eager to adopt the lifestyle changes that are required for the management of GDM; however, for some, this presented some difficulties – despite their willingness – due to conflicts with their cultural beliefs or their familial responsibilities (37).

Ultimately, as women began to accept their condition and no longer viewed it as being burdensome, they began seek out education and knowledge about GDM which improved their experience of GDM by reducing their feelings of stress and anxiety, because they felt better equipped to manage their condition (33).

2.4.3 Experience with healthcare providers

Parsons et al. found that women's experiences with healthcare providers were varied. Those that reported positive experiences felt cared for, particularly during their pregnancy (35). However, after delivery, some women reported not receiving the same level of care they experienced during pregnancy, particularly in light of the postpartum

risk for T2DM (35). Some women reported noticing that some healthcare providers projected anxiety because they felt that achieving a good pregnancy outcome was their responsibility (35).

A common theme that emerged in women's experiences with their healthcare providers was a focus that is solely on the baby, to the extent that they felt that their feelings were not being considered (35). Thus some women stated that the healthcare workers they encountered had bad attitudes, as evinced by their use of a threatening tone when giving them information to produce their adherence to their management protocols (35). This resulted in some women not returning for follow-up visits as they felt intimidated by the way their healthcare providers communicated with them (35).

These negative experiences extended to women feeling stigmatised and not feeling that they are trusted by their healthcare providers, as well as women feeling that the healthcare workers are expecting a lot from them, while not feeling supported (35). Some women expressed a wish that health care workers would understand that being diagnosed with GDM is challenging (35).

In addition, Parsons et al. found that women were concerned about the lack of awareness and knowledge about GDM in the community, particularly the lack of awareness among some healthcare workers that do not work specifically with DM and GDM patients e.g. general practitioners (35).

GDM management is very complex and this can lead to women feeling confused. If communication is not clear or information is not delivered in a way that makes patients feel cared for, this can cause conflict between healthcare workers and women with GDM, which results in poor outcomes (35).

2.5 CONCLUSION

Diabetes is an exponentially growing epidemic. With the change in diagnostic criteria for GDM, more pregnant women are being diagnosed with GDM than in previous years (1).

Healthcare workers were found to improve the management of pregnant women with GDM by offering support and increasing knowledge about GDM. Negative emotional experiences were reported along with poor knowledge of GDM. It would be of great value to do further studies in local settings to ascertain which strategies to implement to improve the knowledge and positive experiences of pregnancy complicated by GDM. The lack of knowledge of GDM among pregnant women leads to poor management of GDM, which contributes to negative experiences of GDM and may lead to poor outcomes.

3. JUSTIFICATION OF THE STUDY

In 2018, Macauley et al. identified GDM as a public health concern in South Africa, specifically its prevalence among Black women, who represent 41,4% of the total population of over 60 million people (7,38). The study found a GDM prevalence of 9.1% amongst black South African women living in urban Soweto (7). Although this rate cannot be generalised to the entire country, it is cause for concern, as GDM increases the risk for complications during pregnancy and post-partum and the development of Type 2 diabetes in both mother and child post-partum (7). Thus, GDM and its sequelae can be deemed as a concern for healthcare practitioners in South Africa, not only for increasing the likelihood of poor pregnancy outcomes, but for the potential increased burden on the healthcare system overall.

Assessing the effectiveness of current management protocol for GDM screening, diagnosis and treatment is thus prudent. This study aims to explore the knowledge and experiences of GDM of post-partum South African women – diagnosed with GDM – at Chris Hani Baragwanath Academic Hospital, as a means to understand the psychosocial impact of the diagnosis and management of GDM, as experienced by GDM patients; how to best serve GDM patients by addressing their needs; and the effectiveness of the current protocols in the management of the aforementioned.

By exploring the lived experiences of GDM patients this study aims to help clinicians to understand the burden and emotional impact of a GDM diagnosis and to elucidate how

clinicians should strive to address these issues, in order to decrease the risk of poor pregnancy outcomes, as well as GDM sequelae such as T2DM.

GDM contributes significantly to morbidity and mortality worldwide and as such; the emphasis should be made on the non-pharmacological treatment of this condition (1). This study will help clinicians to understand the burden and emotional impact of the diagnosis of GDM among women and clinicians should strive to address any issues that arise to produce good pregnancy outcomes.

4. AIMS

The aims of the study are to evaluate the knowledge and experiences of post-partum women diagnosed with GDM, at Chris Hani Baragwanath Academic Hospital (CHBAH) from 1 September 2020 to 30 November 2020.

5. OBJECTIVES

1. To evaluate the knowledge of GDM among post-partum women who had GDM.
2. To explore the experiences among post-partum women who had GDM.

6. METHODS

6.1 STUDY DESIGN

This is a descriptive cross-sectional study.

6.2 SETTING

The study took place at Chris Hani Baragwanath Academic Hospital (CHBAH). It is the third-largest hospital in the world. CHBAH is a tertiary level hospital in Gauteng Province, known as one of the largest hospitals in sub-Saharan Africa. The hospital provides various medical services to the communities of the Soweto and surrounding suburbs in south-western Johannesburg and serves as a referral centre for a secondary level facility (Bheki Mlangeni Hospital) and primary care community health clinics.

CHBAH has many specialist clinics and among these is an obstetric endocrine clinic, of which 90% of patients attending are diabetic pregnant patients. My study will be conducted in Ward 65, where diabetic patients are sent post-delivery.

6.3 STUDY POPULATION

Post-partum women with GDM that attended the postnatal ward (Ward 65) from September 2020 to November 2020.

6.4 INCLUSION CRITERIA

1. Post-partum women with a GDM diagnosis
2. 18 years old and above
3. English-speaking women.

6.5 EXCLUSION CRITERIA

1. Women who had/have sepsis
2. Women with psychiatric conditions
3. All women who have had adverse neonatal outcomes
4. All women who had a Covid-19 diagnosis during pregnancy.

6.6 SAMPLING

A convenience sample was used. Data was collected from 1 September to 30 November 2020 at CHBAH for post-partum women with GDM. The sample identified was 30 women, aggregated over three months. This sample was drawn during the first wave of Covid-19 in South Africa which limited the number of women available and qualified to participate in the study during the 3-month window of our study.

Patients were recruited in the post-natal wards. The researchers attended the ward to recruit post-partum women with GDM, who met the inclusion criteria. Patients were identified on the register and all patients who met the inclusion criteria were recruited. The patients were approached and an information leaflet was given to them to read and

information about the study was also communicated verbally. They were asked if they would like to take part in the study and women who agreed to participate in the study gave their formal consent.

6.7 DEVELOPMENT OF THE QUESTIONNAIRE

For this study the questionnaire was composed of 3 sections. The first section comprised of questions relating to the demographic details for each patient, namely: age, ethnic group, employment and educational level. Questions relating to medical and family history included questions about personal experience of living with diabetes, living with someone who has diabetes, history of pregnancy or GDM diagnosis in previous pregnancies and history of any chronic illnesses.

The second and third sections of the questionnaire comprised of questions related to knowledge of GDM and experiences of GDM respectively.

6.7.1 Knowledge of GDM

To assess GDM knowledge a modified validated questionnaire was used. We adapted the questionnaire from the Diabetes Knowledge Questionnaire (DKN) which is a validated tool for diabetes mellitus knowledge assessment (39, 40). Our questionnaire included 12 questions focusing on general awareness and knowledge about DM and GDM risk factors, diagnosis, treatment, consequences and complications such as untreated GDM increasing the risk of neonatal complications (see Appendix A). These questions were posed as to require “yes” or “no” responses, i.e., participants were asked closed-ended questions that did not require detailed answers.

6.7.2 Experiences of GDM

To assess the participants’ experiences of GDM, the study included a validated semi-structured interview guide, which included ten open-ended questions relating to the lived experiences of post-partum women with GDM (see Appendix A). This questionnaire was developed by the research team and a pilot study was conducted with 5 women to ensure that the questionnaire was in line with our objectives and

appropriate for our setting. This pilot study was commenced once the ethics committee approved the protocol.

6.8 DATA COLLECTION

Data was collected during the first wave of the Covid-19 pandemic in South Africa and the interviewer was donned in full personal protective equipment (PPE) when visiting the postnatal ward. The PPE included: a head cover, a visor, N95 mask, an apron, gown and shoe covers. The PPE was donned and doffed between visits to each participant as an infection control measure.

Each patient's weight and height were measured at the first antenatal visit. This data was noted and accessed via the patient's antenatal records. This data was then used to calculate the BMI of each participant.

A hard copy questionnaire was used to collect data from the study participants. Due to the detailed nature of the questionnaire, at thirty minutes to an hour was required to complete a questionnaire for each participant. All the data from the questionaries was captured electronically and collated in a Microsoft Excel spreadsheet before analysis.

6.9 DATA ANALYSIS

The data regarding the participants' knowledge of GDM was exported from Microsoft Excel to Statistical Package for Social Sciences (SPSS) software for analysis. Frequencies and percentages were used for each variable. The data was analysed using numerical data, mean and standard deviation.

Thematic analysis of the participants' experiences of GDM was conducted using qualitative data analysis software. Transcripts were coded using the software, and thematic analysis was done to identify the main themes emerging from the data (7).

6.10 ETHICAL CONSIDERATIONS

Approval to conduct the study was obtained from the Human Research Ethics Committee (0117172301/0117172700/1234). The protocol was submitted to the post-graduate research committee of the Department of Obstetrics and Gynaecology, University of the Witwatersrand. Approval was obtained from the Chief Executive Officer of Chris Hani Baragwanath Academic Hospital. Consent was obtained from all participating post-partum women with GDM. The study was registered on the National Health Research Data Base.

7. RESULTS

7.1 CHARACTERISTICS OF THE STUDY POPULATION

A total of 30 women were recruited for the study. TABLE 2 shows the general characteristics of the study population. The mean age of the women was 33.9 years (standard deviation = 5.5). 90.0% of the women were black. Fourteen women (46.7%) had at least high school education and 14 had tertiary level education, 1 had only primary level education and 1 had an unspecified level of education. Just over half of the women (53.3%) had planned pregnancies and 93.3% of the women had previous pregnancies.

TABLE 2: GENERAL CHARACTERISTICS OF THE STUDY POPULATION

Characteristics	Total N=30	Percentage of Total
Age		
Mean (standard deviation)	33.9 (5.5)	–
Ethnic group		
Black	27	(90.0%)
White	0	(0%)
Other	3	(10.0%)
Education		
Primary	1	(3.3%)
High School	14	(46.7%)
Tertiary	14	(46.7%)
Other	1	(3.3%)
Employment status		
Employed	14	(46.7%)
Unemployed	16	(53.3%)
Relationship status		
Single	14	(46.7%)
Married (civil)	6	(20.0%)
Married (traditional)	10	(33.3%)
Planned pregnancy		
No	14	(46.7%)

Characteristics	Total N=30	Percentage of Total
Yes	16	(53.3%)
Gestational age at booking (weeks)		
Mean (standard deviation)	16.0 (7.6)	–
Number of children		
0	2	(6.7%)
1	7	(23.3%)
2	8	(26.7%)
3	10	(33.3%)
4	1	(3.3%)
5	2	(6.7%)

7.2 HISTORY OF CHRONIC ILLNESS AND GDM

FIGURE 2. shows the history of chronic illness and GDM amongst the study population. Only four women (13.3%) reported that they had a previous diabetes diagnosis (Type 1or Type 2 diabetes) and six women (20%) had a previous hypertension diagnosis. Nine women (30.0%) had a previous GDM diagnosis.

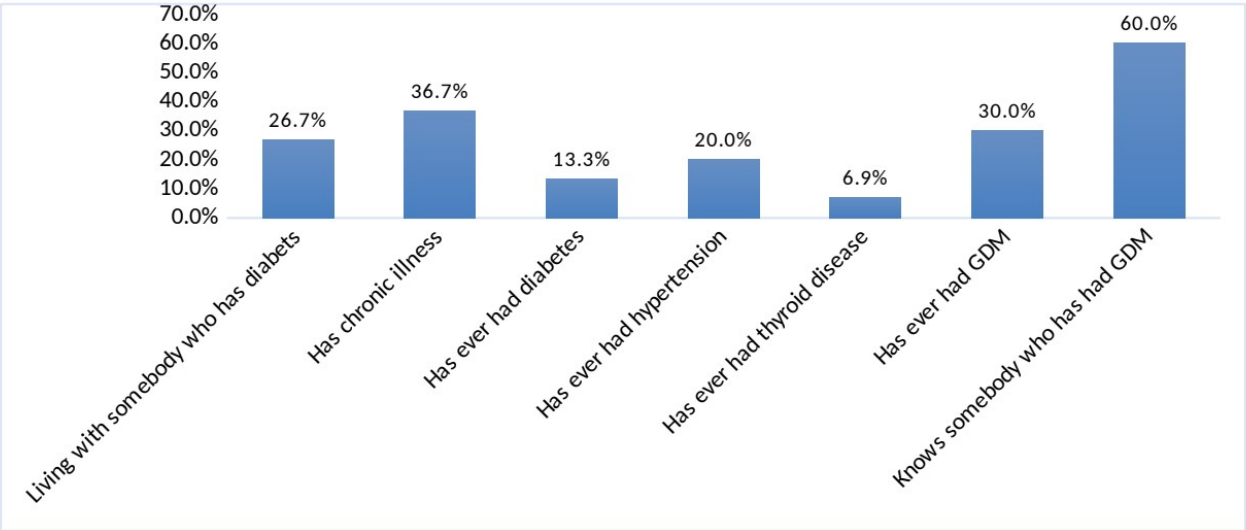


FIGURE 2: HISTORY OF CHRONIC ILLNESS AND GDM

7.3 KNOWLEDGE OF GDM

Table 2 summarises the GDM knowledge amongst the sample. More than two-thirds of the women (70%) knew that an increase in parity increases the risk of GDM and 25

women (83.3%) knew that excessive weight gain during pregnancy increases the risk of GDM. 86.7% of the women knew that GDM increases the risk of future Type 2 diabetes diagnosis.

TABLE 2: GDM KNOWLEDGE

VARIABLE	YES No. (%)	NO No. (%)
1. Increase in the number of pregnancies increases the risk of developing GDM?	21 (70.0)	9 (30)
2. Prior history of GDM increases the risk of future GDM?	23 (76.7)	7 (23.3)
3. Weight gain before pregnancy increases the risk of developing GDM?	20 (66.7)	10 (33.3)
4. Family history of GDM increases the risk of future GDM?	26 (86.7)	4 (13.3)
5. Excessive weight gain during pregnancy increases the risk of GDM?	25 (83.3)	5 (16.7)
6. OGTT is the test to screen for GDM?	28 (93.3)	2 (6.7)
7. The best time a pregnant woman should be screened for GDM is at 24–28 weeks?	24 (80.0)	6 (20.0)
8. Lifestyle and diet modifications are part of the GDM management plan?	27 (90.0)	3 (10.0)
9. Insulin is one of the appropriate GDM management treatment plans?	25 (83.3)	5 (16.7)
10. GDM usually disappears after delivery?	26 (86.7)	4 (13.3)
11. Untreated GDM increases the risk of neonatal complications?	28 (93.3)	2 (6.7)
12. GDM increases the risk of future Type 2 Diabetes?	26 (86.7)	4 (13.3)

7.4 EXPERIENCES OF GDM: THEMATIC ANALYSIS

Through the analysis of the participant responses, subthemes were identified and these subthemes were then grouped together under overarching themes. Four overarching themes were identified: the negative emotions experienced by the women, the opportunity to improve lifestyle or health, concern for own and baby's health, adapting to the GDM diagnosis. These themes are presented below together with subthemes and excerpts of supporting data from the participant responses.

7.4.1 Negative emotions experienced by the women

The theme of "negative emotions" emerged from the analysis of the following subthemes: "patients' experiences of receiving GDM diagnosis", "patients' experiences of changes that occurred after GDM diagnosis" and "patients' feelings about GDM during pregnancy". The most common negative emotions that were cited by the participants were feeling "scared", "stressed", "sad" and "shocked".

SUBTHEME	SUPPORTING DATA FROM PARTICIPANT RESPONSES
Patients' experiences of receiving GDM diagnosis	1. "I was shocked." 2. "I was stressed and confused." 3. "I couldn't believe, I thought the doctor a joking." 4. "I was worried because I thought my baby was going to die." 5. "It a bad experience because I have never had GDM on my previous pregnancies."

Patients' experiences of emotional changes that occurred after GDM diagnosis.	1. "Yes I cried a lot because I was thinking that I was going to inject myself for the rest of my life." 2. "Yes I was so sad because I wasn't happy that I had to change my lifestyle." 3. "I was stressed because this was my first pregnancy and I had a lot to process." 4. "I was very anxious and upset." 5. "Yes I was always angry and I was shouting a lot."
Patients' feelings about GDM during pregnancy	1. "I was stressed because this was my first pregnancy." 2. "I was sad, I was crying all the time." 3. "I was worried that my baby was going to die." 4. "I felt normal because I was taking medication." 5. "I wasn't happy at all because my father died due to diabetes, I was worried this was going to happen to me."

7.4.2 Opportunity to improve lifestyle or health

The theme of "opportunity to improve lifestyle or health" emerged from the analysis of the following subtheme: "factors that enhanced or diminished patients' experience of GDM". Several women saw the chance to improve their understanding of nutrition and healthy eating as a positive aspect of the GDM management protocol, and this made their experience with GDM better. The common thread in the participants' responses was that patients felt that GDM was a wake-up call for them to change their lifestyle for the better. However, some women did find the dietary changes and the consistent monitoring a challenging and negative part of their experience.

SUBTHEME	SUPPORTING DATA FROM PARTICIPANT RESPONSES
Factors that enhanced or diminished patients' experience of GDM	1. "The doctors made my experience better." 2. "It taught me to eat healthy and take care of yourself." 3. "My experience was made better after the nurse told me that after delivery GDM would go away." 4. "Yes, all the monitoring and diabetic diet made the GDM to be a horrible experience." 5. "Diabetic education made the experience of GDM better."

7.4.3 Concern for own and baby's health

The theme of "concern for own and baby's health" emerged from the analysis of the following subtheme: "patients' thoughts on GDM". This theme relates to the women's main concerns following their GDM diagnosis. Their core concerns were framed by concern for their baby's health and concern for their own health, in light of the perceived seriousness of a GDM diagnosis and their fear of the development of T2DM after their pregnancy. The most common response cited was concern about the health of the baby and worry that GDM would have a negative effect on the baby, more than concern for themselves as individuals.

SUBTHEME	SUPPORTING DATA FROM PARTICIPANT RESPONSES
Patients' thoughts on GDM	1. “I had more concern about the health of my baby.” 2. “It is a high risk condition because it can lead to bad outcomes on the unborn baby.” 3. “I thought people who have GDM would never see, touch or hold their babies because I was only thinking about death.” 4. I think when I give birth my baby will get diabetes. It will not get treated, he will grow with it.” 5. “It’s very dangerous to the baby.”

7.4.4 Adapting to the GDM diagnosis

The theme of “adapting to the GDM diagnosis” emerged from the analysis of the following subtheme: “how patients managed their GDM”. There was a wide range of experiences described by women in regards to their experience of living with GDM. Some women appeared to easily adapt to their lifestyle, once they had sufficient knowledge and skills for self-management. Others described the difficulties or frustration that they faced with dietary management. The most common response cited by the participants was that they followed the diet prescribed by the dietician and that this strict adherence to the lifestyle changes required helped them to adapt better to the GDM diagnosis.

THEME	SUPPORTING DATA FROM PARTICIPANT RESPONSES
How patients managed their GDM	1. "I was put on diet." 2. "I was injecting insulin." 3. "I was on diabetic diet and metformin and I was pricking myself six times to check my sugar levels." 4. "I was on diabetic diet and I was drinking lot of water about 3–4 litres a day." 5. "I changed my diet, started to eat more vegetables, fruit, protein and cutdown on carbohydrates and I also did lot of research on GDM."

8. DISCUSSION

8.1 KNOWLEDGE OF GDM AMONG PREGNANT WOMEN

Gestational diabetes is on the rise worldwide, and as such pregnant women are expected to have at least a rudimentary understanding of gestational diabetes and that if untreated, it poses a threat to the progress of their pregnancy. Appropriate and timely management of GDM results in better outcomes for the health of both the parturient and the neonate (18).

There are currently no South African or African studies to assess the knowledge levels of pregnant women about GDM. However, Craig et al which reviewed studies from primarily HIC found that there were varying levels of knowledge about GDM and that the level of knowledge had an effect on how well the women were able to "process and accept" their GDM diagnosis, with those who had knowledge about GDM faring better than those who understood it poorly (21).

Studies in LMICs, such as Saudi Arabia and India, found that pregnant women had poor knowledge about GDM (18, 20,26,). This lack of knowledge has been attributed to low

levels of education, poor socioeconomic status and cultural background (18,20,26). Abdo Salhi et al., found that about 73.2% participants believed that GDM did not affect them as pregnant women and 65.2% of the participants did not believe that GDM has an effect on the health of neonates (26). The Indian study by Balaji et al. showed that although the majority of women knew that they should undergo screening for GDM during pregnancy, many were not clear about the timing of screening (18). Furthermore, it showed that about 75% of rural women did not have any idea about long-term consequences of GDM and 56% did not know that GDM would lead to the development of T2DM in the future (18).

8.2 KNOWLEDGE OF GDM AMONG PREGNANT WOMEN IN THIS STUDY

In this study the majority of the women surveyed have some knowledge about the risk factors, diagnosis and the maternal and foetal effects of GDM. This can be attributed to the fact that all the participants were post-partum, and had already received information about GDM from the healthcare practitioners, during their pregnancy, after being diagnosed with GDM. The level of education could also be a contributing factor, as about 93.4% of the participants have a combination of secondary or tertiary education, which aided in their ability to understand and assimilate the information given about GDM, after their initial diagnosis.

The majority of the women surveyed were aware of all the risk factors for GDM. 70% of the participants stated that an increase in the number of pregnancies increases the risk of GDM. About 76.7% of the participants knew that a previous history of GDM increased the risk of future GDM. 86.7% of the participants knew that a family history of GDM and/or DM increases the risk of future GDM.

About 93.3% of participants in this study knew that the OGTT is the test used to diagnose GDM, and 80% of women know that the right to get screened for GDM is between 24–28 weeks gestational age. Regarding the foetal effects of GDM, 96% of the participants were aware that untreated GDM increases the risk of neonatal complications.

As a result of this knowledge, the majority of the participants were not resistant to complying with the GDM management protocol that was prescribed. This can be attributed to healthcare practitioners providing this information to the pregnant women as soon as they were diagnosed through the screening process, and this occurs at the first antenatal during the first trimester. 89.7% of the participants knew that GDM increases the risk of T2DM, and as a result the majority of these women stated that they would continue with the lifestyle changes prescribed, particularly as regards their diet, in order to decrease their risk of developing GDM or T2DM in the future.

A positive consequence of the knowledge acquired about GDM is that the women surveyed in our study believed that GDM is a dangerous disease, which leads to dire outcomes for their pregnancy and life post-partum. This belief may have contributed to the high rate of compliance to the management protocol prescribed for GDM.

Our study also found that an unintended negative effect of the knowledge acquired about the negative impact of GDM on both the mother and their baby, resulted in contributing to an overall negative experience of their pregnancy due to elevated stress about the possible negative pregnancy outcomes.

The levels of knowledge found in the participants are indicative of the importance of comprehensive information being provided to women, as soon as they are identified through the screening process. Although they may find the initial shock of the diagnosis overwhelming, being armed with simplified yet thorough information empowers them to understand their personal risk profiles, how best to make lifestyle changes that support their maternal and foetal health, as well as how to decrease their risk of post-partum GDM sequalae.

The education levels of mothers may also be a critical factor in their ability to understand and assimilate the information given to them. These education levels are commensurate to the urban setting of Chris Hani Baragwanath Academic Hospital. This

may have implications for peri-urban and rural settings where education levels may be lower. Healthcare practitioners must ensure that greater care is taken to transmit the knowledge about GDM, in a manner that allows these women to assimilate the information in ways that recognise their unique contexts. Further study may also be required to investigate the knowledge of GDM in peri-urban and rural settings and the differentiating factors between urban and rural GDM patients.

8.2.1 Knowledge about exercise and diet modification

In our study, we found that 90% of our participants knew that lifestyle and diet modifications were critical aspects of the GDM management plan, as they had to undergo diet counselling and exercise was a GDM management recommendation given by their healthcare provider upon their initial diagnosis. There are no local studies that are comparable for this finding. However, a similar finding was reported in a Malaysian study by Hussain et al., where they found that knowledge regarding diet was high and they were of the opinion that this knowledge was as a result of 87.3% of their study participants being on a diet plan prescribed specifically to manage their GDM (29).

8.2.3 Knowledge about weight gain as a GDM risk factor

Among all the knowledge categories assessed in this study, the lowest knowledge score was 66.7%, in regard to weight gain as a GDM risk factor. The questionnaire asked if an increase in weight gain before pregnancy would increase the risk of developing GDM, and 66.7% of the participants knew that this was indeed true.

Although a fair number of participants were aware that excessive weight gain is a GDM risk factor, the fact that this was the lowest knowledge score must be noted. Lack of knowledge about the risks associated with weight gain prior to pregnancy, may contribute to an increase in the incidence of GDM and which has been shown to increase maternal and foetal complications secondary to GDM (18). Thus, the link between excess weight gain, GDM and maternal and foetal complication must be emphasised to pregnant women at risk of developing GDM or already diagnosed with GDM.

In the study conducted by Balaji et al., the majority of women were unaware that obesity was a risk factor for GDM and future T2DM (18). Balaji et al stated that in India attitudes towards healthy lifestyle habits with regard to diet and food choices or options are largely driven by cultural norms and socioeconomic factors (18). We can extrapolate this notion to our study participants, as diet is also largely mediated by cultural norms and socioeconomic factors, as was stated by some of our study participants in their responses.

Balaji et al also noted that, until recently, poverty was a major driver of poor nutrition in India and thus many perceived obesity as not putting them at risk for diabetes (18). This postulation may also apply to South Africa where there are socio-cultural norms that associate overweight bodies with beauty and wealth and larger bodies are not perceived as being “unhealthy” (41).

8.3 EXPERIENCES OF GDM AMONG PREGNANT WOMEN IN THIS STUDY

8.3.1 Emotional impact of GDM on pregnant women

Shock, fear and stress were among the emotions described by the majority of women surveyed, regarding their diagnosis and subsequent management of GDM. This provides a clear insight into the emotional and psychological impact and burden that a GDM diagnosis can produce in pregnant women. These findings are consistent with what was observed in an Australian study done by Morrison et al where women described being shocked as they did not expect to receive this diagnosis (37). Some women in our study stated that the GDM diagnosis had a negative impact on their entire pregnancy and future pregnancy plans while others adapted well to the diagnosis. These findings are consistent with research suggesting that the experience of at-risk pregnancy is associated with feelings of heightened vulnerability, lack of control, and increased stress (37).

Many women expressed feelings of sadness and fear after being diagnosed with GDM. Some blamed themselves for the diagnosis, which lead to more strain throughout the entire pregnancy. The majority of the participants were unhappy about the diagnosis and 90% expressed that they were “shocked”, “scared” or “stressed”. Receiving the GDM diagnosis was interpreted as an indication that they would have a difficult pregnancy, that would require frequent visits to a diabetic clinic. A similar finding was also reported in an Australian study where women expressed that constant contact with health professionals, during their pregnancy was guilt and fear-inducing (35).

Amongst the responses from the participants regarding factors that either enhanced or marred their experiences of being pregnant with GDM were women that felt the education provided about managing GDM made their experience of GDM better, while others felt that there was nothing at all that made their experience of GDM better. The latter can be identified as the women that indicated being constantly stressed throughout their pregnancy because of their GDM diagnosis.

8.3.2 Healthcare providers and experience of GDM among pregnant women

Healthcare practitioners and women with GDM are under immense pressure to control blood glucose levels, in order to ensure a healthy infant and mother post-partum (35). This can lead to somewhat paternalistic attitudes and care in the healthcare provision context, where information is held by, and decisions are largely made by, the healthcare provider on the assumption that health – in this case that of the baby – is the priority, rather than allowing the mother to exercise her autonomy and decision-making capacity by making personal choices within her control, empowered through informed consent, in collaboration with her healthcare provider (35).

In this study some women reported having a great experience of care and support from the doctors and nurses in the subsequent management of their GDM. The main reason that was cited by this group of participants was that they felt cared for and special during a difficult period, particularly the fact that they were made to feel that the health of the baby was as important as that of the mother. These findings are similar to those

in the research done by Parsons et al, where it was reported that many women praised their obstetricians and diabetes health professionals for the intense education and support provided (35).

8.3.3 Socioeconomic, psychosocial and social impact of GDM on pregnant women

Our study participants reported a negative impact on their employment and the strain produced by their socioeconomic status. The diabetic clinic requires frequent visits to monitor their GDM and as a result, many women had to be absent from work so frequently that they received verbal warnings for absenteeism from their employers. Many patients in the study were from low-income backgrounds and could not afford the diet prescribed by the dietician. This increased the negative impact of their experience of GDM as they were concerned about their health and were not able to figure out lower cost alternatives for their prescribed diet.

Our study participants also indicated that their GDM diagnosis had an impact on their families' functionality. Some families had to change their eating habits in support of the pregnant women which some families found financially strenuous and socially burdensome.

These findings regarding the experiences of women with GDM indicate the importance of understanding both the psychosocial and socioeconomic impact of a GDM diagnosis. The emotional burden on mothers, as well as the additional financial and social implications of GDM are factors that can lead to poor compliance to GDM management protocols.

The emotional burden of GDM can result in depression, anxiety during pregnancy and increased risk of postpartum depression (35). Thus, where resources are available psychosocial support for GDM patients may be a prudent addition to GDM management.

The socioeconomic factors, such as inability to afford dietary changes prescribed for GDM management, may require a more context specific diet counselling and for dietitians to provide a wider range of dietary options, across wider scale of affordability. Diet counselling must be tailored to each patient's socioeconomic status and geographic location, as well as cultural norms.

The social factors regarding family cooperation and support may require for pregnant women to attend their diabetic clinic visits with partners or family members to help them to understand how best to support the GDM patient throughout the pregnancy as well as to provide psychosocial support at each visit. However, this may also prove difficult in situations where women will come unaccompanied because diabetic clinic visits are during working hours and during the work week. Where resources are available, hospitals should make diabetic counselling available during weekends or after-hours.

9. LIMITATIONS OF THE STUDY

The Covid-19 pandemic greatly affected the ability of this study to recruit a larger sample size of participants. The small sample size (n = 30) of the study means that our results are not generalisable to South Africa's maternal population, thus further study can employ larger sample sizes. The population was not demographically diverse and participants did not represent a wide range of views, particularly the fact that women who could not speak English were excluded.

10. CONCLUSION

This study showed that the majority of the participants have adequate knowledge about GDM. The data evinces that the management programme for GDM at CHBAH is effective as far as educating GDM patients about the condition, its risk factors and its maternal and foetal effects. However, the study also found that many women have negative experiences of GDM during their pregnancy. This can be attributed to the intense visit schedules and management strategies that may not be accessible or feasible to all women diagnosed with GDM due to varying socioeconomic and employment status.

Pregnancy on its own, can be an emotional time for the pregnant woman. Adding a diagnosis such as gestational diabetes may worsen this experience. The insights derived from this study emphasise the important role that healthcare professionals play in providing information and support to women with GDM and provides some insight into the challenges and opportunities for future diabetes risk reduction.

Further studies are required to study the knowledge and experiences of GDM amongst pregnant women in South Africa, that include a more representative demographic profile across the country's provinces.

11. RECOMMENDATIONS

- Providing a wider range of dietary and exercise options for GDM management
- Expanding hours for diabetic counselling visits to include weekends and possibly after hours where possible
- Include support for management of family pressures, socio-cultural norms and expectations
- Expanding the GDM management protocol to include psychosocial care and support

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APPENDIX A: DATA COLLECTION SHEET

SECTION 1: BASELINE CHARACTERISTICS OF THE STUDY POPULATION

1. Age
2. Ethnic group

BLACK	WHITE	COLOURED	OTHER

3. What is your highest education completed?

PRIMARY	HIGH SCHOOL	TERTIARY EDUCATION	OTHER

4. Employment

EMPLOYED	UNEMPLOYED	SELF-EMPLOYED	INFORMAL EMPLOYMENT	OTHER

5. What is your relationship status?

SINGLE	MARRIED (CIVIL)	MARRIED TRADITIONALLY	NEVER MARRIED

6. Was the pregnancy planned?

YES	NO

7. How far were you pregnant when you went for your first visit to the clinic?

.....

.....

8. How many children do you have?.....

SECTION 2: MEDICAL HISTORY

CHRONIC ILLNESS HISTORY (5)	YES	NO
1. Are you living with someone who has diabetes?		
2. Do you have any chronic illnesses?		
3. Have you ever had diabetes?		
4. Have you ever had hypertension?		
5. Have you ever had a thyroid disease?		
PREGNANCY-RELATED HISTORY (2)		
1. Have you ever had GDM?		
2. Do you know someone who has GDM?		

SECTION 3: GDM KNOWLEDGE ASSESSMENT

I am going to read several statements now about diabetes in pregnancy (which I will refer to as GDM). For each statement, please tell me whether you think it is correct or not correct.

KNOWLEDGE ABOUT GDM RISK FACTORS (5)	**YES**	**NO**
1. Increase the number of pregnancies increases the risk of developing GDM		
2. Prior personal history of GDM increases the risk of future GDM		
3. Weight gain before pregnancy increases the risk of developing GDM		
4. Family history of GDM increases the risk of future GDM		
5. Excessive weight gain during pregnancy increases the risk of GDM		
KNOWLEDGE ABOUT GDM DIAGNOSIS (2)	**YES**	**NO**
1. OGTT is the test to screen for GDM		
2. The best time a pregnant woman should be screened for GDM is at 24-28 weeks.		
KNOWLEDGE ABOUT GDM TREATMENT (2)	**YES**	**NO**
1. Lifestyle and diet modifications are part of the GDM management plan		
2. Insulin is one of the appropriate GDM management plans		
KNOWLEDGE ABOUT GDM CONSEQUENCES/COMPLICATIONS (3)	**YES**	**NO**

1 GDM usually disappears after delivery		
2 Untreated GDM increases the risk of neonatal complications		
3 GDM increases the risk of future type 2 diabetes		

SECTION 4: LIVED EXPERIENCES OF POSTPARTUM WOMEN WITH GDM

1. What were your experiences after you were told you have GDM?

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2. What are your thoughts about GDM?

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3. Did you experience any changes after you were told you have GDM?

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4. Did you experience any emotional changes after you were told you have GDM?

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5. How did you take care of your GDM?

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6. Has having GDM had any effect on your life? (Family and work)

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7. How did you feel when you were told you have GDM?

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8. How did you feel during the pregnancy about GDM?

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9. How was your experience with the care you received from the diabetic nurses and doctors?

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10. Is there anything that made your experience with GDM better or worse?

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APPENDIX B: UNIVERSITY OF WITWATERSRAND HUMAN RESEARCH ETHICS COMMITTEE PERMISSION

APPENDIX C: PERMISSION TO CONDUCT RESEARCH: DEPARTMENT OF OBSTETRICS AND GYNAECOLOGY, CHRIS HANI BARAGWANATH ACADEMIC HOSPITAL, CLINICAL HOD

APPENDIX D: PERMISSION TO CONDUCT RESEARCH: DEPARTMENT OF OBSTETRICS AND GYNAECOLOGY, CHRIS HANI BARAGWANATH ACADEMIC HOSPITAL, HOSPITAL CEO

APPENDIX E: TURNITIN REPORT