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Nurses' Perspectives of Geophagic Women of Childbearing Age Accessing Healthcare in the Reproductive Healthcare Services in Tshwane District, Gauteng Province: An Exploratory Study

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Abstract: Geophagy is an ancient widespread practice that is common amongst women of childbearing age globally. Geophagy is one of the leading causes of iron deficiency and pregnancy complications amongst women of childbearing age resulting in maternal, neonatal, and child morbidities and mortalities globally. The concept of geophagy has yet to be incorporated in the reproductive health services in the healthcare facilities. A qualitative study was conducted using focus group discussions and in-depth interviews to explore the views/perspectives of nurses regarding geophagic women of childbearing age accessing healthcare in the reproductive healthcare services in Tshwane District, Gauteng Province. The findings revealed that nurses perceived geophagic women of childbearing age to be iron deficient and lack proper knowledge and understanding of the potential health risks and dangers of soil eating. Mental health and substance use disorders, food and nutrition deficiencies, absence of geophagy health education, and promotion programs were highlighted as some of the aspects that play a role towards the practice of geophagy amongst women of childbearing age accessing healthcare in Tshwane District, Gauteng Province. Thus, a conclusion can be made that geophagy health education and promotion programs in the antenatal care units must be prioritized by government.

Keywords: geophagy; nurses; perspectives; women of childbearing age; Tshwane District

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1. Introduction

Geophagy (Geophagia) is defined as the deliberate ingestion of earth materials and food of no nutritional value such as dirt, clay, chalk, kaolin, rocks, soil, sand, and sediments, particularly by women of childbearing age and those who are pregnant [1–4]. Geophagy is a common practice in both developing and developed countries worldwide [5,6]. Geophagy is a pre-historic practice that exists since the fourth century in the ancient times across the globe, in both developing and developed countries, particularly in Africa [5–8]. Geophagy is commonly practiced and more prevalent amongst pregnant women in African countries such as Ghana, Nigeria, Rwanda, Tanzania, Kenya, and South Africa [7,9–12]. Geophagy is also known to be endemic in South Africa [7,9]. In South Africa, where this study was conducted, geophagy phenomenon amongst women of childbearing age has been reported mainly in Limpopo, Gauteng, Kwa-Zulu Natal, Free State, and Eastern Cape [7,9,13].

Geophagy amongst pregnant women is of public health importance and requires attention and interventions as stipulated by SDG 3 which is aimed at reducing the global maternal mortality ratio to less than 70 per 100,000 live births and end preventable deaths of newborns and children under five years of age, with all countries aiming to decrease

neonatal mortality to at least 12 per 1000 live births by 2030 [14]. The prevalence in the African region was about 40%, and the prevalence amongst pregnant women before and after birth was reported to be 28% [15]. Furthermore, the prevalence of geophagy among pregnant women in the catchment area of our study in Tshwane district, South Africa was reported to be 54%, which is relatively high compared to other areas [16]. Health complications that are commonly experienced by geophagic women of childbearing age include blood disorders, reproductive system interruptions, cancers, pregnancy complications, and maternal and child mortalities [1,2,15–17]. Adverse birth outcomes linked with geophagy behavior amongst pregnant women include premature birth, neural tube defects, low birth weight, and elevated prenatal death due to heavy metals toxicity in maternal nutrition [2,16,18]. This poses a serious challenge to the overburdened healthcare facilities to cater for the healthcare needs of geophagic women of childbearing age with little resources available.

Clinicians have reported that they witnessed women and children indulging in soil-eating habit as compared to men who are rare soil or clay eaters [19–21]. Nurses have reported that geophagy happens due to hormone imbalances or changes and iron deficiencies amongst pregnant women who usually come to access health services in the healthcare facilities [19,22]. It was further reported that geophagy can be associated with mental health diseases, macronutrients deficiencies, human immunodeficiency virus, and gastrointestinal issues particularly amongst women of childbearing age who are not pregnant [19–21]. The perspectives of clinicians, particularly nurses, are not adequately captured, since there is little literature published pertaining to the phenomenon of geophagy that covers nurses' perspectives. Therefore, this study aimed to explore the views/perspectives of nurses with respect to geophagic women of childbearing age accessing healthcare in the reproductive services in Tshwane District, Gauteng Province.

2. Results

2.1. Socio-Demographics Information of Participants

The participants comprise nineteen females nurses and one male nurse, who were allocated in the antenatal care services and family planning units. Their ages ranged from 30 to 60 with an average of 46 years. A total of 55% of the participants were single, 45% were married, and 5% were divorced. Nineteen participants possessed a minimum qualification of a diploma in nursing, either from a college or a university, up to a maximum qualification of a master's degree, with one participant holding a matric certificate and several short-course certificates. Eight × participants reported their occupation title as professional nurse, four × as enrolled nurse, two × registered nurse, followed by five × nurses and one × nursing assistant. Their years of working experience ranged from 2 years to 31 years with an average of 15 years. Table 1 shows the socio-demographics characteristics of the nurses who participated in the study.

Table 1. Socio-demographics information of participants.

Variable	Frequency
Gender	
Male	1
Female	19
Age	
(30–39)	6
(40–49)	5
(50–59)	8
(60–69)	1

Table 1. *Cont.*

Variable	Frequency
Marital status	
Single	11
Married	8
Divorced	1
Occupation	
Nursing assistant	1
Nurse	5
Registered nurse	2
Enrolled nurse	4
Professional nurse	8
Working experience in years	
(1–9)	7
(10–19)	5
(20–29)	6
(30–39)	2

2.2. The Nurses' Perspectives Regarding Geophagic Women

The nurses reported on their perspectives regarding geophagic women which included causes, motivations, triggers, and aspects that are linked to the practice of geophagy among women of childbearing age in Tshwane District, Gauteng Province. The findings of this study were summarized and demonstrated into four main themes and sub-themes (see Table 2 below).

Table 2. The findings of this study were summarized and demonstrated into four main themes and sub-themes.

Theme	Sub-Theme	Category
Motivation by food and nutrition deficiencies	Vitamins, minerals, and nutrients deficiencies	Nutritional factors
	Low iron food intake	
Geophagic practice triggered by mental health and substance use disorders	Underlying life problems	Psychosocial factors
	Mental disorder challenges	
	Stress	
Practice caused by iron deficiency	Low hemoglobin	Clinical factors
	Increased desire for iron intake	
Ingestion exacerbated by absence of Health Education and Promotion programs on geophagy	Lack of geophagy health education at antenatal care and family planning units	Community education factors
	Lack of knowledge and understanding on the chemical composition of clay soil, geophagy potential health risks, and soil dangers.	

2.2.1. Motivation by Food and Nutrition Deficiencies

The participants hold perspectives that geophagic women of childbearing age indulged in the practice of geophagy, motivated by minerals, vitamins, and nutrients deficiencies. The food choices and preferences that are often made by clay soil consumers sometimes contain inadequate minerals such as iron. The participants also revealed that geophagic

women of childbearing age misunderstood and misinterpreted their physiological and nutritional needs particularly when pregnant; hence, they indulged in the practice of geophagy. It was also reported by participants that most geophagic women of childbearing age are unable to properly respond to their cravings for earth materials such as clay soil; hence, they engage in the practice of geophagy. The views of nurses toward geophagic women of childbearing age are expressed below:

> "*They lack proper knowledge and information on how to manage their cravings and deficiencies in their body". "Most people do not understand how a human body functions, the nutrient, vitamin, and mineral deficiencies. . . they respond mostly to every desire they feel. They do not eat healthy food that are also rich in iron intake and clay soil causes them to lose appetite, some start developing iron deficiency symptoms. . . the person would become pale especially when you check their hands and nail" (A 50 years old professional nurse).*

> "*They have iron deficiency. They lack knowledge of dealing with pregnancy cravings and sometimes, it is the issue of these patients taking the pills provided to them during the consultation and putting them at home without drinking them. Then when they experience shortage of iron in their bodies, they start with soil eating" (A 55 years old professional nurse).*

2.2.2. Geophagic Practice Triggered by Mental Health and Substance Use Disorders

The participants hold views that geophagic women of childbearing age practice geophagy because they are triggered by mental health and substance use disorders. Most participants viewed geophagic women to have underlying mental health challenges, addiction, dysfunctionality, stress, and life problems. Participants further perceived that women of childbearing age practice geophagy to distract themselves from their stressful life situations. Such views are expressed below:

> "*In my assessment, I think they have some sort of mental health situation. It is some sort of abnormality. How can you eat soil? Something is wrong—they don't think well. Yes because. . . We know that soil is associated with filth—we urinate there, we defecate there. So, how can a normal person take a decision to eat soil?" (A 42 years old professional nurse).*

> "*I believe soil addiction has something to do with mental health disorder that occurs when one start experiencing uncontrollable cravings. People living with addictions find it difficult to resist the urge to feed their cravings. Other people start eating soil as a form of distraction and coping mechanism when they are faced with stressful situations that they scared to confront in their lives" (A 34 years old professional nurse).*

2.2.3. Practice Caused by Iron Deficiency

This theme is about lack of adequate red blood cells and iron deficiency development in women of childbearing age who practice geophagy. Most participants have reported iron deficiency as the major causes of clay soil ingestion amongst women of childbearing age. It was also reported by participants that people partake in soil-eating behavior with hope of acquiring the required iron that is inadequate in their bodies. Most participants stressed that in their experience, women of childbearing age who practiced geophagy were mostly those who were iron deficient which is a clinical feature characterized by low hemoglobin. Their views are shared below:

> "*They have lack of iron (iron deficiency anaemia) and lack proper knowledge. They need to be taught about the dangers of eating clay soil because the pregnancy of someone who eat soil is different to the pregnancy of a patient who is not a consumer" (A 58 years old nurse).*

> "*They have iron deficiency/anaemia mostly; hence they start craving clay soil. Such patients most have low (Hemoglobin) Hb" (A 39 years old enrolled nurse).*

> *"They have anaemia, and they need assistance to prevent them to have a difficult pregnant journey" (A 56 years old professional nurse).*

2.2.4. Ingestion Exacerbated by the Absence of Health Education and Promotion Programs on Geophagy

The nurses that took part in this study expressed their perspectives that the lack of proper knowledge, understanding, and misinformation are the leading factors exacerbating the practice of geophagy amongst women of childbearing age. The participants perceived that the chemical content of clay soil and the associated potential dangers pertaining to human health are often not known and understood by geophagic women of childbearing age. Participants associated geophagy with low level of health education and literacy. Participants expressed views that geophagic women of childbearing age practice geophagy for incorrect reasons emerging from false information since there are no geophagy health education and promotion programs. Their perspectives are presented below:

> *"They lack knowledge because soil eating can cause many unnecessary health conditions, sometimes people develop worms. There is a risk of developing appendicitis because of soil eating. . . so it is a dangerous practice that people are not aware of" (A 49 years old nursing assistant).*

> *"I think they need assistance; they lack knowledge because they eat dirt. They risk having complications during their pregnancy. Some are mis-informed they eat soil thinking there are benefits" (A 58 years old professional nurse).*

> *"I think it is lack of knowledge about the dangers of eating soil especially during pregnancy that leads women of childbearing age to practice geophagy" (A 41 years old registered nurse).*

> *"They lack awareness of the health effects and dangers of eating soil" (A 55 years old nurse).*

3. Discussion

Geophagy has been reported to be one of the behaviors that are associated with many factors including clinical, physiological, psycho-social, educational, and nutritional aspects [8,18,21,23]. This study has explored the perspectives of nurses regarding geophagic women of childbearing age accessing healthcare in the reproductive healthcare services consisting of the antenatal care and family planning units in Tshwane District, Gauteng Province.

The nurses that took part in this study expressed their viewpoints that geophagic women of childbearing age consume food with low iron intake, and some find it difficult to understand the physiological and nutritional needs which informs how geophagic women respond to their minerals, vitamins, and nutrients deficiencies. It is revealed by nurses who participated in the antenatal care units that most women of childbearing age start experiencing shortage of essential minerals, vitamins, and nutrients when they are pregnant, however, only few understand the dynamics that comes with pregnancy; hence, they respond to the urge by consuming earthly materials like clay soil. Studies found that geophagy is linked to nutritional deficiencies [21,24–26].

The nurses that participated in this study revealed that women of childbearing age who practiced geophagy are also triggered by mental health and substance use disorders such as addiction, life problems, dysfunctionality, and stress to engage in the practice of geophagy. Other nurses that took part in this study hold perspectives that geophagic women of childbearing age are using geophagy as a coping mechanism to avoid dealing with underlying issues such as stress and life problems. A similar study found that geophagic women use clay soil ingestion as a way to combat stress [21]. At times, clay soil consumers resort to substance use when they are troubled or faced with challenging circumstances as a form of distraction to avoid dealing with stressful situations.

The participants explained that most women of childbearing age who practice geophagy are mainly those who are iron deficient. Nurses who participated in this study view iron deficiency as one of the major causes of clay soil ingestion amongst women of childbearing age, which manifests in a form of cravings for clay soil and other soil types. Studies confirm that geophagy is mainly caused by iron deficiency amongst geophagic women [2,23,27–29]. People who practice geophagy consume clay soil aspiring to supplement iron intake; however, excessive ingestion of clay soil can lead to the development of iron deficiency as well.

Women of childbearing age often experience the need for emergency surgeries such as blood transfusion post childbirth due to iron deficiency. Although these participants were able to link geophagy amongst women of childbearing age with iron deficiency, it was discovered that the antenatal care units hardly ask women about geophagy or provide health education about geophagy as part of their antenatal care services. A similar study conducted in Northern Uganda [30] found parallel results indicating that geophagy is not discussed with pregnant women at the antenatal care units; both pregnant women and non-pregnant women accessing health in the healthcare facilities received no health education or information about geophagy from either nurses or doctors or any other healthcare practitioner [30]. The nurses only investigate a possible case of geophagy amongst women of childbearing age when they notice that the patient's hemoglobin is low. In other words, despite geophagy being a serious public health problem amongst women of childbearing age, geophagy is still not incorporated as part of antenatal care services and maternity package for pregnant women.

The participants have reported that pregnant women are provided with iron supplements, magnesium, and folic acids to assist with the increased intake of minerals, vitamins, and nutrients required by the fetus and the mother during pregnancy; however, not much effort is taken to assist women of childbearing age who are not pregnant to quit geophagy practice. Furthermore, a gap was identified that geophagic women of childbearing age, particularly those who are pregnant, often take supplements for iron and folic acids distributed at healthcare facilities but never adhere to such supplements. Similar studies have also reported poor adherence towards prescribed folic acid and iron supplements amongst women of childbearing age [26,31–33]. This implies that instead of geophagic women of childbearing age taking iron supplements medication or seeking medical care, they opt to consume clay soil to cater to their physiological and nutritional needs.

The participants hold perspectives that ingestion of clay soil by women of childbearing is exacerbated by the absence of health education and promotion programs on geophagy. The nurses who participated in this study further indicated that they previously assisted women of childbearing age who practiced geophagy and who demonstrated a lack of knowledge and understanding pertaining to the potential health risks and dangers of soil eating. Most nurses who took part in this study hold views that geophagy is mainly practiced by women of childbearing age with low health education status, who are not familiar with the consequences of soil eating, let alone the toxic chemical, physical, and biological constituents of clay soil which serve as major public health concern associated with different health outcomes. A similar review study has reported that geophagy is still a broadly misunderstood phenomenon in Africa [20].

In other words, most geophagic women of childbearing age are not aware that soil eating is harmful and has the ability to negatively affect their health. This can be prevented if geophagy health education was prioritized at antenatal care service units. The current interventions aimed at mitigating geophagy amongst women of childbearing age to prevent maternal, neonatal, and child mortality rates are not yielding adequate results and progress, since the number of women of childbearing age who practice geophagy accessing healthcare in the healthcare facilities keeps on rising. There is a strong need to strengthen geophagy health education and promotion at primary healthcare, antenatal care and family planning units, at schools, and at various community levels. The development of geophagy programs should be established to educate women of childbearing age about the dangers of geophagy,

in order to promote safe pregnancy outcomes and prevent maternal, neonatal, and child morbidities and mortalities that are linked to geophagy.

4. Materials and Methods

4.1. Study Setting

The study was conducted in Tshwane District located in Gauteng Province (refer to Figure 1). Tshwane has an estimation population size of 3.4 million [34] excluding undocumented immigrants. Tshwane is the administrative capital city of South Africa, and Gauteng is known as the economic hub. Nurses allocated in the public healthcare facilities located in Tshwane District areas such as Mamelodi, Ga-Rankuwa, and Soshanguve were targeted to form part of the study settings because the majority of the population seeks medical care from public healthcare facilities as compared to private healthcare facilities that are mostly located in the suburbs. Tshwane District is dominated by black Africans, whites, and mixed race. The most commonly used languages in Tshwane District include Setswana, Sepedi, Isizulu, Xitsonga, English, and Tshivenda. Tshwane District is also dominated by men, women, youth, children, and elderly people from different cultures and traditions and has a large population of women of childbearing age who also practice geophagy.

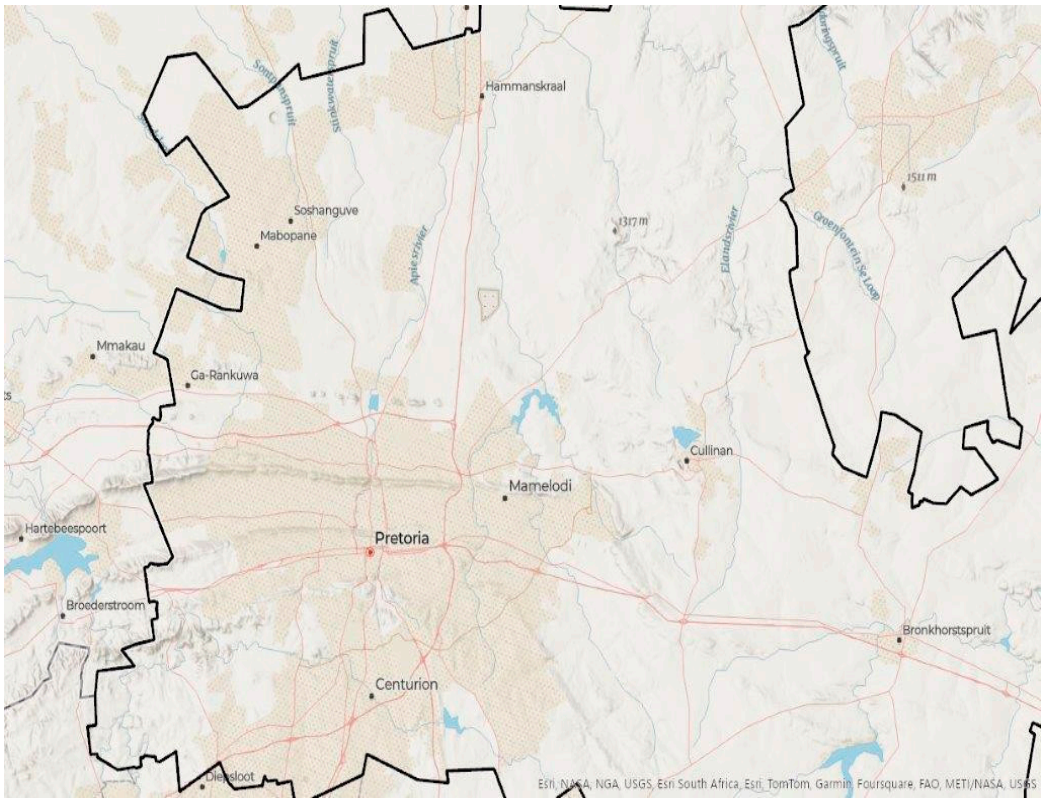

Figure 1. Map of Tshwane District.

4.2. Study Design

A qualitative study was conducted to explore the perspectives of nurses allocated in the family planning and antenatal care units in the selected healthcare facilities of Tshwane District, Gauteng Province regarding geophagic women of childbearing age accessing healthcare in the reproductive healthcare services in Tshwane. An exploratory qualitative design was best suited for this type of study to explore the perspectives of nurses towards geophagic women of childbearing age in an in-depth manner.

4.3. Study Population

Nurses allocated in the family planning and antenatal care units in the healthcare facilities of Tshwane District, Gauteng Province were included in this study as participants. One participant was recorded as a nurse assistant because she recently completed her nursing degree and was promoted to the position of nurse; she was waiting for the human resource department to finalize her documentation.

4.4. Sample Size and Sampling Technique

Purposive sampling technique was used to select nurses, which were willing to participate in the study, allocated in the antenatal care and family planning units. The sample size was determined via data saturation, which is the stage where participants are no longer giving new information. The researcher conducted in-depth interviews and focus group discussions and reached a sample size of n = 20. The researcher conducted 2 focus group discussions and 8 in-depth interviews. The rationale for conducting both focus group discussions and in-depth interviews was to explore the perspectives of nurses towards geophagic women of childbearing age in depth.

4.5. Recruitment

Recruitment started after receiving research ethics approval from the Sefako Makgatho Health Sciences University Research Ethics Committee and Tshwane Research Committee. The researcher scheduled meeting appointments with facility unit managers and executive managers in the public healthcare facilities in Tshwane District, Gauteng Province to formally introduce herself and request permission to conduct the study. The study purpose, aims, and objectives were discussed at length with the authorities. As soon as permission to access the facilities was granted, the researcher went to the antenatal care units and family planning units to recruit potential participants. The researcher shared information leaflets, ethics approval of the study, purpose, aims, and objectives during the recruitment process. Those who agreed to form part of the study during the recruitment process were requested to give written informed consent before any further participation in the study.

4.6. Data Collection Process

Data collection commenced post-receiving ethical approval from Sefako Makgatho Health Sciences University Ethics Committee. Approval to conduct the study was also sought and obtained from the Department of Health, healthcare facilities, and informed consent received from participants. The research was conducted using an interview guide that consisted of open-ended questions and a recording device. In-depth interviews and focus group discussions were conducted with nurses to explore their perspectives with respect to women who practice geophagy accessing healthcare in the reproductive services. In-depth interviews and focus group discussions for nurses were conducted in the private rooms requested by facility managers in the healthcare facility of Tshwane District, Gauteng Province. An interview guide adapted from the published literature by [35] was used during the in-depth interviews and focus group discussions with nurses. The interview guide was written in English for nurses and questions were asked in English during interviews. Data collection took 3 months in 2023. The rationale for using both in-depth interviews and focus group discussions to collect data was to accommodate all participants, considering the tight and busy schedule of nurses allocated in the antenatal care and family planning units.

4.7. Data Analysis

A computer device was used to record and store data qualitative data collected during in-depth interviews and focus group discussions. Data were processed and analyzed using the NVivo software 14. The researcher transcribed the audio recordings for both focus group discussions and in-depth interviews. The transcripts were edited, cleaned, and exported to the NVivo software 14 to identify and arrange codes. Thematic analysis

steps were followed to analyze the data, and a codebook was developed [36]. Familiarity with the data was performed by repeatedly reading the transcripts to identify the possible codes, categorical data, and patterns. The codes were generated, and similar topics were merged and reviewed to develop themes and sub-themes to produce coherent, concise, non-repetitive, and logical data. The new themes were reviewed and added, which were used to present the findings in the report. Following the n-vivo software, 60 codes were generated from the study transcripts for all settings and participants. To cater for this objective, 4 themes were developed to present the study findings. Three people served as coders, the researcher, the co-supervisor, and the statistician. The researcher worked with the co-supervisor to code data and compared their codes and themes with the data of the statistician who served as an independent coder. Discussion meetings to contrast generated coded, sub-themes, and main themes between the researcher, the co-supervisor, and the statistician were held. Where the coders differed, some deliberations were held to reach agreements. Descriptives statistics were used to describe socio-demographics data of nurses in Tshwane District, Gauteng Province.

4.8. Trustworthiness

As a qualitative research, trustworthiness was necessary to ensure dependability, transferability, conformability, and credibility of the study findings [37]. The researcher kept track of field notes for all phases of the study to ensure dependability. Credibility was ensured through recording and transcribe verbatim when conducting both in-depth interviews and focus group discussions to ensure accuracy of data collected from all study participants. A thick description of the methodology and procedures was employed in this study to allow application of the same methodology in different settings and populations, ensuring transferability. Conformability was achieved through auditing to ensure coherence of themes so that the results reflect the true perspectives of the participants.

4.9. Ethical Considerations

Clearance and approval were obtained from the Sefako Makgatho Health Sciences University Research Ethics Committee (SMUREC/H/290/2023:PG). Permission to conduct the study in the public healthcare facilities was sought from the National Health Research database committee (Tshwane Research Committee), senior managers of the healthcare facilities, and unit managers in the antenatal care and family planning units of Tshwane District, Gauteng Province. Research ethical principles that were observed in the study included informed consent, privacy, confidentiality, protection of personal information, voluntary participation, and right to withdraw from the study at any given time without any penalization.

5. Conclusions

It is concluded that nurses associated geophagic women of childbearing age accessing healthcare in the reproductive health services to be iron deficient. Geophagy was perceived to be practiced by women of childbearing age with low health education status, who lack proper knowledge and understanding on the potential health risks and dangers of soil eating. A conclusion can thus be made that geophagy health education and promotion programs in the antenatal care units must be prioritized by government.

6. Study Limitations

Some of the nurses who participated in this study indicated that they hardly ask women of childbearing age whether they practice geophagy or not when they come for consultations, unless there were some concerns with hemoglobin levels, which might have served as a limitation for this study.

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Informed Consent Statement: Written informed consent forms were obtained from the nurses who participated in this study.

Data Availability Statement: Data can be made available upon request.

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