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**Research Article**

# Geophagia in Nigeria: Perceptions and Practices of Pregnant Mothers versus Possible Health Outcomes

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## ABSTRACT

This study aimed at ascertaining the perceptions and practices of pregnant mothers on geophagia, as well as highlighting possible health outcomes. For the cross-sectional survey, a structured questionnaire was designed, content-validated by experts, pre-tested and used for data collection. The questionnaires were administered to 200 pregnant mothers at health care facilities in southern Nigeria (particularly in Calabar and Onitsha), who consented to be part of the study. The findings of this study show that about (75%, n=150) of the pregnant mothers admitted to consuming edible clays both during and after pregnancy with (60.6%, n=120) of them stating that it was a safe practice during pregnancy. Also, the results show that income level and educational attainment significantly ($p<0.05$) influenced the perception and practices of the respondents regarding geophagia. Of the 2 edible clays explored in this study, kaolin clay was more popularly consumed than bentonite clay. With regards to respondents' health status, none of them admitted to developing anaemia or any chronic disease during pregnancy. In conclusion, edible clays are still commonly consumed by women in Southern Nigeria, irrespective of age and exposure. Scientific reports show that these clays contain appreciable amounts of certain anti-nutrients and heavy metals, hence it is necessary to create awareness on the possible dangers related to their increased consumption, particularly during pregnancy.

## INTRODUCTION

Pregnancy is a sensitive physiological state with its peculiarities. During pregnancy, pica which is the craving for non-food substances such as ice, soil, soft stones, commonly occurs (Myaruhucha 2009; Johnson 2017). Geophagia is a common form of pica; it has to do with the ingestion of soil, earth and clay substances (Taiye *et al.* 2013). Edible clay is commonly known as calabash chalk. Calabash chalk is one of such geographic material prevalently consumed in many countries. The health and wellbeing of both mother and child can be at risk during gestation, if proper attention is not given to adequate nutrition. The current focus of research is on the complex relationships between food intake and disease, consumer knowledge and dietary patterns, economic status, and consumer choices relating to various foods and non-food substances, including organic, genetically modified, and conventional ones. This is because healthy diets play a major role in preventing diseases and maintaining health (Wardle 2000). Furthermore, the increase in the prevalence of chronic diseases and maternal mortality, is also a growing cause for concern. According to Onyenweaku *et al.* (2019), dietary modifications in addition to synthesized drugs, is now being employed while managing and treating illnesses linked to food. People are becoming increasingly aware of the importance of being mindful of what they consume, especially as it concerns those in the vulnerable groups such as infants, pregnant mothers and the elderly.

Geophagic practices appear to be as old as human-kind and are more prevalent in some places than others (Odangowei & Okiemute

2015). Geophagia was seen as a superstitious practice during the 16th and 18th centuries, which is why efforts were made to both avoid it and offer treatment to those who practiced it (Ekosse & Jumbam 2010). Some women who practice geophagia believe that it enhances beauty, and it helps pregnant women manage morning sickness or even boosts fertility (Mogongoa *et al.* 2011). Generally, there are three main hypotheses about the physiological reasons of pica, which include starvation, a lack of certain micronutrients, and defense against infections and poisons (Odangowei & Okiemute 2015). Pregnant women in Africa believe that consuming soil will aid in a smooth delivery and improve the baby's dark skin pigmentation. According to George and Ndip (2011), Some explanations offered by expectant mothers include: basic cravings based on their texture and scent; the ability of soils to lessen morning sickness symptoms; hunger pangs; and the notion that soils can supply certain micronutrients crucial for the developing fetus. Nevertheless, existing evidence suggests that geophagic practice is not exclusive to the impoverished; it transcends all racial, religious, socioeconomic and racial divides (Abrahams 2002; Onyenweaku 2023).

In general, geophagia is regarded as a pregnancy-related custom, cultural practice, or religious practice (Woywodt & Kiss 1999), or as a treatment for illness (Dominy *et al.* 2004; Onyenweaku 2023). Many people who practice geophagia do so because, culturally speaking, they watched their mothers or close relatives eat clays. These clays contain chemical elements some of which are essential to human health, while others may be toxic or even lethal, depending on the individual dosage (Gomes & Silva 2007). For many centuries, anemia, or low iron levels, has been associated with geophagia (Odangowei & Okiemute 2015). Recently, scientists and medical professionals have validated this long-held finding (Odangowei & Okiemute 2015). The focus has been on lead's toxicity when it comes to chemical elements found in geophagic materials. Well known as a neurotoxin, lead is especially dangerous for young people's developing brains and nervous systems. It is a thing of concern that urban soils contain substantial amounts of Lead, Calcium even Zinc. The internal accumulation of soils (clay) in the body may cause not only abdominal pain and constipation, but may also lead to obstruction and perforation of the large intestine (Bateson & Lebroy 1978; Odangowei & Okiemute 2015). Some cases have been reported in some pregnancies of deaths and dysfunctional labour brought on by internal soil buildup (Horner *et al.* 1991; Odangowei & Okiemute 2015).

Knowledge/awareness plays a key role in determining people's lifestyle, the choices they make and consequently their health outcomes; thus it is necessary that people are properly aware of the foods they consume and its effect on health (Wardle *et al.* 2000; Nyawo *et al.* 2021). Summarily, the studies report that nutrition knowledge affects people's dietary choices/patterns in the same way irrespective of their financial levels (Shimokawa 2013). Thus, this study assessed the perceptions and practice of pregnant mothers regarding geophagia and also possible health outcomes as a result of this practice.

## METHODS

### Design, location, and time

Cross-sectional study design using a convenience sampling method was employed in this research. It was carried out at antenatal clinics in General hospital, Onitsha, Iyi-enu mission hospital, Ogidi, Anambra state and General hospital Calabar, Cross River state. Structured interviews were conducted in April, 2023, using an anonymous, self-structured, closed-ended questionnaire designed specifically for the study. Respondents were approached, then asked to carefully read and comprehend the research objectives before completing the questionnaire. The informed consent attached assured the participants that all information given were to be strictly used for research purposes. Participants' responses were recorded anonymously and kept confidential. Names and/or contact information were not required of participants. Participants voluntarily agreed to take part in this anonymous study by signing the consent forms and proceeding to complete the questionnaire.

The study received ethical clearance in February 2023 from the University of Calabar Teaching Hospital's Health & Research Ethics Committee in Cross River State (file reference HREC/021/23).

### Sampling

The study population consisted of 200 pregnant women, who attended antenatal clinics

in General hospital, Onitsha, Iyi-enu mission hospital, Ogidi, Anambra state and General hospital Calabar, Cross River state. Convenience and random sampling methods were used to get the study participants. Random sampling (within the study population) of pregnant mothers attending antenatal clinics, was employed to find research subjects, increasing the sample size to 200 individuals overall. The inclusive criteria for the study were healthy, pregnant women while the exclusive criteria were - men, children, and non-pregnant women.

**Data collection**

A well-structured questionnaire based on the study objectives and literature review was created in order to collect data from the respondents. The questionnaire was content-validated by experts in the field, then pre-tested on 20 persons who were excluded from the main study. The questionnaire's reliability coefficient (Cronbach Alpha) was 0.7. The questionnaire was designed to collect sociodemographic information, participants' perceptions and practices with regards to geophagia, and health status. The Microsoft word document of the questionnaire was prepared then hard copies were printed for circulation.

Pregnant women's practices of eating soil were documented, and their attitudes and beliefs regarding geophagia were investigated through the use of a questionnaire. The questionnaire comprised of three sections. Section A was on background information (socio-demographic variables), Section B was designed to collect data on the respondents' perception and practice of geophagy, while Section C was designed to ascertain the health status of respondents. Duly completed copies of the questionnaire were used for analysis.

The questionnaires were taken by research assistants to the different health facilities where the participants attended antenatal clinic. Some of the respondents were assisted by the research assistants to fill the questionnaires to enhance accuracy and minimize ambiguity in responses. Participation in the study was voluntary.

**Data analysis**

The statistical package for social sciences (SPSS, version 25.0) was utilized in this study to analyse data. Furthermore, to specify the percentage of answers to each question and the overall distribution in the total score of each questionnaire, descriptive statistics like frequencies, percentages, and charts were employed. Correct responses were scored 1 or 2 points respectively while wrong perceptions were scored zero (0). A total score was recorded for each participant. To look for associations between selected variables, Pearson's Chi square test were also utilized. The selected variables were educational level, income and geophagic perceptions/practices scores, and significance was accepted at $p<0.05$.

## RESULTS AND DISCUSSION

Table 1 presents the socio-demographic characteristics of the surveyed population (200 pregnant mothers). Almost 60.0% of them were aged below 40 years. Majority of them (77.5 %, n=155) were married while 6.5% were separated from their spouses. Many of the respondents (72.5%, n=145) had a Tertiary Education and above. In addition, most of the respondents (71.0%, n=142) were working in the Private sector and (51.0%, n=102) revealed that their monthly income ranged between ₦50,000.00 and ₦149,000.00 which is between 50USD and 150USD. Out of the 200 respondents in this study, 174 of them lived in 2–6 person households.

**Perceptions and practices of respondents regarding geophagia**

The responses given by the participants generally indicated good knowledge of the subject – geophagia. The findings on the perceptions and practices on the consumption/use of edible clays by respondents, are presented in Table 2. From the results, only 33.0% admitted that the consumption of edible clays ("Nzu" and "Ulo") is good for health, but up to 70.0% reported consuming edible clays. Many of the respondents (60.6%, n=120) felt that edible clay consumption is safe during pregnancy, with 83.5% stating that the edible clays do not contain any micronutrients and antioxidants that are useful to the body. Furthermore, 37.0% of the respondents believe that edible clay consumption helps to relieve morning sickness in early pregnancy, with 54.5% stating that both clays can be used on the face as an anti-ageing mask as well as a cure for acne and pimples. About 77.0% believed that the consumption of edible clays can neither cause hypertension nor can it lead to a decrease in appetite.

**Table 1. Socio-demographic characteristics**

| Variable | n=200 | % |
|---|---|---|
| Age group (years) | | |
| 18–29 | 46 | 23.0 |
| 30–39 | 70 | 35.0 |
| 40–49 | 56 | 28.0 |
| 50–59 | 26 | 13.0 |
| >60 | 2 | 1.0 |
| Ethnicity | | |
| Igbo | 42 | 21.0 |
| Hausa | 30 | 15.0 |
| Yoruba | 71 | 35.5 |
| Others | 57 | 28.5 |
| Marital status | | |
| Single | 26 | 13.0 |
| Married | 155 | 77.5 |
| Separated | 13 | 6.5 |
| Widow | 6 | 3.0 |
| Education | | |
| No formal education | 3 | 1.5 |
| Primary | 2 | 1.0 |
| Secondary | 50 | 25.0 |
| Tertiary | 71 | 35.5 |
| Post grad education | 74 | 37.0 |
| Income | | |
| <₦50,000 (50USD) | 13 | 6.5 |
| ₦50,000–₦149,000 (50–150USD) | 102 | 51.0 |
| ₦150,000–299,000 (150–300USD) | 77 | 38.5 |
| >₦300,000 (300USD) | 8 | 4.0 |
| Occupation | | |
| Public Sector | 43 | 21.5 |
| Private sector | 142 | 71.0 |
| Company | 13 | 6.5 |
| Informal | 2 | 1.0 |
| Household size | | |
| Staying alone | 17 | 8.5 |
| 2–3 persons | 120 | 60.0 |
| 4–6 persons | 54 | 27.0 |
| >6 persons | 9 | 4.5 |
| Total | 200 | 100.0 |

₦: Nigerian Naira; USD: US Dollar

**The association of educational attainment on perception and practice of geophagia**

Table 3 shows the results of the regression analyses carried out on respondents' perceptions and educational level. The logistic regression model was statistically significant ($p<0.05$), as the table illustrates. From the results, that perceptions and practices of the respondents differed significantly according to educational status, hence education significantly ($p<0.05$) affected the respondents' perceptions and practices of geophagia. Similarly, the check for association between income levels and respondents' perception/practice of geophagia also revealed that the respondent's income significantly ($p=0.001$) affected their perception of edible clay consumption.

**Health status of respondents**

In Table 4, the health status of the respondents showed that none of them reportedly had anemia, while about 32.6% admitted to having hypertension and 67.4% had been previously diagnosed of diabetes. Generally, up to 65.4% reported that they developed no serious health issues during pregnancy. Among those who admitted having specific health issues during pregnancy, 12 of them reported that they had abdominal pain during pregnancy. Up to 24 of the pregnant mothers said they had malaria during pregnancy while 8 of them had typhoid fever. With regards to the effect of geophagia on respondents' health, 93.3% reported that they have not observed any negative changes during/after pregnancy due to their consumption of edible clays.

**The association between participants' health status and practice of geophagia**

Table 5 shows the results of the regression analyses carried out on respondents' geophagic practices and their health status, especially during pregnancy. The logistic regression model showed statistical significance ($p<0.05$), as can be observed in the table. From the results, the consumption of both kaolin clay and bentonite clay significantly affected the participants' history of chronic illnesses, and their experience of ill health during pregnancy. The issue of having health challenges during pregnancy as a result of geophagia was not significantly affected by their consumption of the edible clays. The frequency of consumption of the edible clays did not seem

**Table 2. Perceptions and practices of the respondents regarding geophagia**

| Variable | Sub-variable | n | % |
|---|---|---|---|
| 1. Do you think that the consumption of edible clays is good for health health? | No | 108 | 54.0 |
| | Yes | 66 | 33.0 |
| | Not sure | 26 | 13.0 |
| 2. Is geophagia safe during pregnancy? | No | 47 | 23.7 |
| | Yes | 120 | 60.6 |
| | Don't know | 31 | 15.7 |
| 3. Do edible clays contain micronutrients and antioxidants that are useful to the body? | No | 167 | 83.5 |
| | Yes | 18 | 9.0 |
| | Don't know | 15 | 7.5 |
| 4. Do you think consumption of edible clays can alleviate morning sickness in pregnancy? | No | 83 | 41.5 |
| | Yes | 74 | 37.0 |
| | Not sure | 43 | 21.5 |
| 5. Do you think edible clays be used on the face as anti-ageing mask and for acne/pimples? | No | 30 | 15.0 |
| | Yes | 109 | 54.5 |
| | Not sure | 61 | 30.5 |
| 6. In your opinion, does the consumption of edible clays help in the treatment of poisoning? | No | 58 | 29.0 |
| | Yes | 16 | 8.0 |
| | Not sure | 126 | 63.0 |
| 7. Do you think the consumption of edible clays can increase blood pressure? | No | 154 | 77.0 |
| | Yes | 12 | 6.0 |
| | Not sure | 34 | 17.0 |
| 8. Does consumption of edible clays decrease one's appetite? | No | 156 | 78.0 |
| | Yes | 7 | 3.5 |
| | Not sure | 37 | 18.5 |
| 9. Do you consume edible clays? (such as kaolin 'nzu' & bentonite 'ulo') | Never | 57 | 28.5 |
| | Sometimes | 104 | 52.0 |
| | Only during pregnancy | 39 | 19.5 |
| 10. How often do you consume edible clays? | Do not consume | 57 | 28.5 |
| | <3 times a week | 82 | 41.0 |
| | 3–6 times a week | 49 | 24.5 |
| 11. Do you consume kaolin clay? | Daily | 12 | 6.0 |
| | Yes | 151 | 75.5 |
| | No | 49 | 24.5 |
| 12. Do you consume bentonite clay? | Yes | 143 | 71.5 |
| | No | 57 | 28.5 |

*1–8 indicate their perceptions while 9–10 indicate the practice of geophagia

**Table 3. Association between educational attainment and respondents' perceptions and practice of geophagia**

| Variable | Education | n | Mean | SEM | *p* |
|---|---|---|---|---|---|
| Practice | No formal education | 3 | 6.00 | 0.00 | |
| | Primary | 2 | 5.00 | 0.00 | |
| | Secondary | 50 | 4.98 | 0.13 | 0.001 |
| | Tertiary | 71 | 4.59 | 0.07 | |
| | PGE | 74 | 5.12 | 0.10 | |
| Perception | No formal education | 3 | 0.00 | 0.00 | |
| | Primary | 2 | 2.00 | 0.00 | |
| | Secondary | 50 | 5.60 | 0.27 | 0.001 |
| | Tertiary | 71 | 5.75 | 0.18 | |
| | PGE | 74 | 5.31 | 0.27 | |

*PGE: Post Graduate Education; p-value based on Logictic Regression analysis; SEM: Standard Error of the Mean

to affect the health status parameters except for history of chronic diseases (p=0.000).

Young, educated pregnant mothers made up a larger portion of the study population. Most of the women were well-educated and earned a decent income. From their responses, many of the women had a basic knowledge of the concept of geophagia and the risks associated with the consumption of edible clays. A tiny but noteworthy portion of respondents (9.0%) claimed that the body can benefit from the micronutrients and antioxidants found in kaolin and bentonite clays. This agrees with the findings of Umudi (2017) and Ejike and Ogugua (2017) which showed that edible clays contain significant amounts of micro and macro elements. The results of this study also show that the women are not very aware of the nutritional and non-nutritional content of edible clays yet a greater portion of them were consuming the clays. This aspect differs from the findings of a few additional studies where knowledge improved

**Table 4. Health status of respondents**

| Variable | Sub-variable | n | % |
|---|---|---|---|
| History of Anaemia | Yes | 0 | 0.0 |
| | No | 195 | 100.0 |
| Previously diagnosed with chronic diseases | Diabetes | 116 | 67.4 |
| | Hypertension | 56 | 32.6 |
| | Total | 172 | 100.0 |
| History of health issues during pregnancy | No | 117 | 65.4 |
| | Yes | 60 | 33.5 |
| | Not sure | 2 | 1.1 |
| Other health issues developed | Abdominal pain | 12 | 20.0 |
| | Catarrh & Cough | 2 | 3.3 |
| | Fever | 14 | 23.3 |
| | Malaria | 24 | 40.0 |
| | Typhoid | 8 | 13.3 |
| | Total | 60 | 100.0 |
| Had observed changes in subsequent pregnancy due to geophagia | No | 167 | 93.3 |
| | Yes | 3 | 1.7 |
| | Not sure | 9 | 5.0 |

**Table 5. Association between educational attainment and respondents' perceptions and practice of geophagia**

| Variable | Practice of geophagia | Pearsons Chi square | *p* |
|---|---|---|---|
| History of chronic diseases | Consumption of kaolin clay | 19.720 | 0.000* |
| | Consumption of bentonite clay | 27.197 | 0.000* |
| Experience of health challenges during pregnancy | Consumption of kaolin clay | 8.292 | 0.081 |
| | Consumption of bentonite clay | 8.387 | 0.078 |
| Having pregnancy-related illness due to geophagia | Consumption of kaolin clay | 5.003 | 0.287 |
| | Consumption of bentonite clay | 6.199 | 0.185 |
| History of chronic diseases | Frequency of consumption of the edible clays | 45.76 | 0.000* |
| Experience of health challenges during pregnancy | Frequency of consumption of the edible clays | 8.875 | 0.181 |
| Having pregnancy-related illness due to geophagia | Frequency of consumption of the edible clays | 7.253 | 0.298 |

Significant at $p<0.05$ based on Logistic Regression analysis

dietary intake and overall health (Ahmad *et al.* 2022; Onyenweaku 2022), and it goes to show that people can sometimes make unhealthy dietary choices as a result of their unawareness. This can lead to grave consequences such as diet-related chronic diseases. Furthermore, the results from this study show an association between participants' educational level and their perceptions/practices as well as, income also influencing their perceptions/practices of geophagia. The higher the level of education of the participant, the higher the perception score and vice versa. Participants income levels also varied proportionally with their scores. Woywodt and Kiss (1999) on the contrary rejected the idea that poverty was the cause, pointing out that the practice of geophagia was common among the impoverished, slaves, and satisfied laborers and that it was not stopped by an abundance of food.

Some of the arguments put forth by geophagic people for its practice include detoxification of the body, nutrient supplementation, alleviation of gastrointestinal disorders such as diarrhea, nutrient supplementation, relief from morning sickness and cravings (Gomes & Silva 2007) or as part of cultural practices (Ngole & Ekosse 2012). Notwithstanding the apparent advantages of geophagia, certain research has linked the habit to detrimental health outcomes like iron deficiency anemia. (Mogongoa *et al.* 2011), dental problems (e.g enamel damage), perforation of the colon and erosion of the mucosal surface of the stomach (Barker 2005; Ekosse & Anyangwe 2012), hypokalaemia (Bisi-Johnson *et al.* 2010), zinc deficiency and apprehension (Singh *et al.* 2021) infection caused by parasites that spread Ascaris lumbricoides and other highly toxic bacteria that cause tetanus and botulism (Saathoff *et al.* 2002; Bisi-Johnson *et al.* 2010). Unfortunately, no proven treatments for pica have been established yet, although selective serotonin-reuptake inhibitors may offer some relief in some cases - but therapy and diagnosis need to be customized for each patient (Phakoago *et al.* 2019; Attarh *et al.* 2021).

It has been observed that the practice of ingestion of soils and clays may be intentional or unintentional. Previous research has traced the history and global prevalence of geophagia. Research indicates that the habit is not exclusive to any specific gender, age bracket, geographical location, ethnicity, or historical era (Njiru *et al.* 2011); however, young children are especially vulnerable to the soil-eating habit. Children aged below 20 months usually explore the

environment by putting whatever they pick up into their mouths. Above this age however, deliberate consumption of soil/earth is often considered abnormal (Abrahams 2002). Some pregnant women in the southern United States used to consume foods like clay, corn starch, and baking soda as part of a cultural practice. They believed that these foods prevented vomiting, promoted baby growth, treated swollen legs, and guaranteed the birth of healthy, attractive children. In addition, kaolin, or gray native clay, is a common food for expectant mothers in rural southern Georgia. They claim that the "dirt" helps them feel better and less sick during pregnancy and they crave for it (Odangowei & Okiemute 2015). This shows that eating clay is a common practice among women outside of Africa. In five more African nations namely: South Africa, Zimbabwe, Zambia, Swaziland and Malawi, where a similar study was conducted in their rural areas, the estimated prevalence level of geophagia was about 90% (Walker *et al.* 1997) which is higher than the 70% prevalence recorded in this study. The possibility also exists that geophagia could be declining with modernization. Several soil types have been reportedly consumed by individuals that are geophagic, such as termite mounds, red, white, yellow, and brown clay types, among other types of soil. This study focused on the consumption of just two edible clays – kaolin (white) and bentonite (grey). Louba *et al.* (2004), reports that in Kenya, earth from termite mounds and soft stone, referred to locally as "Odowa," were the two types of earth that Kenyan women preferred to consume. In this study carried out among women in southern Nigeria, the preferred type was bentonite clay because it was tastier.

Furthermore, a close look at the health implications of geophagia, not only shows negative effects but some benefits have been reported. Ekosse and Jumbam (2010) examined the mineralogy and chemistry of some commercially available geophagic samples from Cameroon and Nigeria, two West African countries where geophagia is highly prevalent. They concluded that clay-eaters may profit from their potential therapeutic and dietary benefits. For instance, calcium is known to be important for proper bone development, especially for foetuses and infants. Hooda *et al.* (2002) and Shkembi & Huppertz (2021) claim that calcium from edible clays augments the calcium obtained from other dairy sources such as milk and cheese. The assertion that certain pregnant women who are deficient in calcium are more susceptible to geophagia could be supported by this claim (Gomes & Silva 2007; Odangowei & Okiemute 2015). The findings of this study also show a direct association between the experience of illnesses during pregnancy, having a history of chronic diseases and the consumption of edible clays. Only the frequency of consumption of these clays did not seem to directly affect the participants' health status. According to Smith *et al.* (2000), some research also assert that geophagia introduces a direct soil-human geochemical pathway because an individual may receive vital micronutrients like iron (Fe) from the soils or clays they ingest. Trade in geophagic materials for medicinal purposes provides a source of revenue (Vermeer & Ferrel 1985) hence, there could be some economic and health benefits related to the practice of geophagia. Summarily, many factors seem to influence the perceptions and practices surrounding the practice of geophagia which is still quite common among women particularly pregnant mothers.

This study was limited to two cities in the Southern part of Nigeria due to lack of research assistants to go round other places for data collection. This limited the sample area and size. Another common issue with most surveys that can be challenging to verify, is the validity of the responses.

## CONCLUSION

This study reports that despite modernization, the prevalence of geophagia among pregnant mothers is still relatively high. This may be as a result of the perceptions and practices on the consumption of edibles which have been reported by the women. The cross-sectional survey carried out at two different health centres in Cross River and Anambra states show that some of the perceptions and practices on geophagia are right – based on a review of existing literature. On the other hand, some perceived benefits from the consumption of edible clays are yet to be proven, hence they cannot be seen as correct. Kaolin clay was more consumed than bentonite clay but both clays were reported to be consumed in significant quantities by the participants of the study. Despite not being well acquainted with the nutritional and non-nutritional content of the clays, most

women still indulge in the practice of geophagia. Previous research has reported that geophagia is implicated in maternal anaemia, hypokalemia, zinc deficiency, apprehension and other health challenges. The women in this study however did not report having any serious health issues during pregnancy as a result of their clay consumption. Nevertheless, increased awareness of the possible health consequences of geophagia will go a long way in persuading women, especially pregnant mothers, to consume the clays with caution. Women are encouraged to consume healthy snacks such as fruits, as a way of reducing the cravings of geophagia during pregnancy.

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## DECLARATION OF CONFLICT OF INTERESTS

The author declares no conflict of interests.

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