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Geophagic Practice in Vhembe District, Limpopo Province, South Africa

Abuh Momoh[1*], Henry A. Akinsola[2], Makhado Nengovhela[1], Segun A. Akinyemi[3] and Olusola J. Ojo[4]

[1]Department of Mining and Environmental Geology, University of Venda, Thohoyandou, 0950, Republic of South Africa
[2]Department of Public Health, University of Venda, Thohoyandou, 0950, Republic of South Africa
[3]Department of Geology, Ekiti State University, Nigeria
[4]Department of Geology and Mineral Sciences, University of Ilorin, Nigeria

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ABSTRACT Earth materials are consumed by human beings for a wide variety of reasons, namely, for mineral nutrient supplementation, protection from toxins and for cultural norms. The aim of this study was to estimate the prevalence of geophagic practices, causative reasons for geophagy and types of earth material consumed by geophagists. The purposive sampling technique was used to identify 438 female geophagists (Earth eaters) in the Vhembe District in South Africa. Socio-economic features, causative reasons and benefits derived from the eating of earth materials were assessed using a self-administered questionnaire. Results indicated that forty-six percent of the women were married, forty-five percent were single, five percent were divorced and four percent were widows. They were mainly engaged in farming, wage labor, and petty trading, with very few of them in the civil service. The main reasons for geophagic practice among the women were for the soothing taste, quelling of nauseate feelings, and pleasant flavor. The preferred types of earth materials were soft stone (22%) and clay (34%). The mean daily intake of earth materials for pregnant women was 90g, while mean daily intake for non-pregnant women ranged from 40 to 60g. The study revealed high prevalence of geophagic practice amongst women of diverse ethnicities and different age groups in Vhembe District, South Africa.

INTRODUCTION

Geophagy or geophagia, the deliberate ingestion of earth materials (clays, sands, ant hills, termite mounds and dried up pond sediments) by human beings and other members of the animal kingdom is a universal practice. The practice cuts across the globe, including Americas, the British Isles, Europe and Africa (Perridge et al. 2011) The habit is prevalent in sub-Saharan Africa and has also been documented in the following countries: South Africa, Swaziland, Nigeria, Zambia, Tanzania, Ghana, Uganda, Malawi, Zimbabwe and Cameroon (Abrahams and Parsons 1997; Nchito et al. 2004). The prevalence of geophagy among pregnant women was found to be sixty-five percent in Kenya, forty-six percent in Ghana, forty-two percent in Namibia and twenty-eight percent in Tanzania (Kawai et al. 2009).

Human beings indulge in geophagic practices for a wide variety of reasons. It is believed that the consumption of earth materials acts as an agent to counteract diarrhea, as a supplement intake of available copper (Cu), calcium (Ca), zinc (Zn) and magnesium (Mg) by rural communities, to reduce abdominal pain caused by heart burn and nausea, and in the treatment of dysentery and cholera amongst the Chagga women of Tanzania (Wilson 2003; Ngole et al. 2010; Ekosse et al. 2011).

According to Wilson (2003), three main theories were advanced to explain geophagic practices, namely, hunger, micronutrient deficiency and protection from toxins and pathogens. The geophagic practice is motivated by an attempt to mitigate the harmful effects of plant chemi-

[*]Address for correspondence:
Abuh Momoh
Department of Mining and Environmental Geology
University of Venda, Private Bag X5050
Thohoyandou, 0950
South Africa
Phone: +27159628636
Mobile: +27720433833
Fax: +27159628569
E-mail: abkenomai@yahoo.com

cals or microbes (Keay 1982). It was proposed that geophagic soils protect by either adsorbing pathogens or toxins within the gut lumen or coating the surface of the intestinal endothelium thereby rendering it less permeable to toxins and pathogens (Keay 1982).

Eating of earth materials could lead to some serious health problems in human beings, including mechanical bowel disorder and nutritional dwarfism (Abrahams 2002), severe abdominal pain, obstruction and perforation of the colon, which may result following the internal accumulation of soil (de Jager and Ekosse 2011). Research had shown that some geophagic materials (soils, clays and soft stones) contained at least one of the following geohelminths, *Ascaris lumbricoides, Trichuris trichuria, Nectar americanus, Ancylostoma duodenale and Strongyloides stercoralis*, in the Eastern Cape Province, South Africa (Sumbele et al. 2014).

Diverse types of geophagic materials that are consumed by geophagists include clays, sands, anthills, termite mounds and dried up stream sediments. Pica, another form of geophagy (charcoal and wall scraping's) and amylophagy (ice eating), is equally practiced by human beings. Golden et al. (2012) conducted a maiden population based study of pica and amylophagy in Madagascar and reported that the prevalence of geophagy was 53.4 percent, amylophagy 85.2 percent and other non-food items chalk and charcoal was 19.2 percent.

Geophagic behavior has been widely reported in parts of South Africa namely, the Thabo Mofutsanyane District, Free State, Eastern Cape Province, Qwa-Qwa and Manguang areas in Central South Africa (Perridge et al. 2011). However, no report exists on geophagic practice in Vhembe District, Limpopo Province, South Africa.

Objectives

The objectives of this study were to determine the prevalence of geophagic practice amongst the female population in the area and to ascertain the types, amount of earth materials consumed and preferences for these earth materials.

METHODS

Study Area and Population

The study was conducted in four Municipalities, namely, Thulamela, Musina, Makhado and Mutale that make up the Vhembe District in Limpopo Province. The majority of the resident population is the Vendas, with other residents including the Tsonga, Pedi, Zulus and Ndebele from Zimbabwe. The total population of the District is 1.2 million of whom women form about 55 percent (Amidou 2007). The study population was limited to female geophagists that attended local clinics and hospitals during the period of the study. A total of four hospitals and twenty rural clinics across the district were used for the study. Four hundred and thirty-eight (438) subjects were selected for the study and interviewed using the questionnaire. A purposive sampling technique was used to identify individuals who were geophagic in the selected hospitals and clinics for interview

Ethical Approval

Permission to conduct the study was granted by the Health, Safety and Research Ethics Committee, University of Venda (SES/10/MEG/001) and Ethical Committee in the Health and Social Welfare Department of Limpopo Provincial Government (REF 4/2/2). An informed signed consent was obtained from all participants before the questionnaires were administered to them. They were given assurance that the study was only for geophagy research in the Vhembe District.

Questionnaire Instrument

A questionnaire was developed to obtain information from women geophagists in the District. The questionnaire was translated into local languages namely, *Tshivenda*, *Sotho* and *Pedi* and pretested and verified for error on thirty women. Information regarding demographic data of individuals who practice geophagy and their economic profiles were obtained. The questionnaire covered aspects of causative reasons for geophagic practice, kinds of earth materials, benefits derived from eating earth materials and the distribution chain of geophagic materials.

After an introductory group discussion about human consumption of earth materials by the research team, questionnaires were administered with the assistance of a fieldworker in the local languages of *Venda*, *Pedi* and *Sotho*, after the women had signed the consent form. The research was restricted to geophageous women (pregnant and non-pregnant women) for the age

of 15 years and above based on the recommendations of the Ethics and Research Committee of Health and Social Welfare Department, Limpopo Provincial Government. The sampling pattern was to reflect the notion about geophagic practice, which is mainly associated with women; hence men were excluded from the study. The age of the respondents ranged from 15 to 65 years. The women were asked to estimate their daily intake of the earth material by picking an appropriate amount from earth sample provided by the research team. This was then weighed at the laboratory of the Department of Mining and Environmental Geology, University of Venda. A descriptive statistics (percentages) was used for the analysis using SPPSS version 16.0.

RESULTS

Most (46%) of the participants were married women or single (45%), while five percent were divorced and four percent were widowed (Table 1). The women were mainly from the Venda ethnic group. The economic level of the female geophagists was mainly in the subsistence cadre (56%), while middle-income earners were represented by nineteen percent of the entire sample. Affluent female geophagists comprised fourteen percent of all the study participants. The results on the number of previous pregnancies of the female geophagists revealed that sixty percent of the women had gone through 1-3 pregnancies or 4-6 pregnancies (14%), while twenty-six percent of the geophagists had no record of previous pregnancy (Table 1).

The kinds of earth materials eaten were mostly clay (34%) soft stone (22%), termite mound (20%) while some ate sand (16%) and wall scrapping (8%), respectively (Table 2). Most of the female geophagists enjoyed a soothing taste (45%), closely followed by those that derived a nice feeling in the mouth (30%), while twenty percent enjoyed a pleasant flavor from eating earth materials.

The majority of the respondents ate earth materials several times (48%) a day, while twenty-nine percent ate it once a day and twenty percent ate earth materials once in a while. Only a very few respondents, about three percent, hardly ever ate earth material in the area.

The quantity of earth materials consumed by the participants was relatively high as the majority (44%) consumed above 90g of earth materials when they are pregnant. A few (16%) respondents consumed 71-90g, while four percent of the respondents consumed less than 70g a day. When asked if they noticed any undesirable effects after eating earth materials, the majority (89%) said they did not notice any effect, while eleven percent noticed abdominal pain. Most of the respondents consumed the earth material as dry chunk (61%), while some consumed it as powder (20%), and nineteen percent consumed it in powdered form and chunks (Table 2).

Table 1: Demographic and socio economic features of female geophagists (n = 438)

Demographic and socio-economic variables	*n*	*Percentage (%)*
Location		
Rural	201	46
Urban	237	54
Marital Status		
Married	201	46
Single	197	45
Divorced	22	5
Widow	18	4
Age (in years)		
15–25	102	23.2
26–35	184	42
36–45	90	20.5
46–55	50	11.4
56 - 65	12	2.7
Occupation		
Schooling	158	36
Wage labour	92	21
Trading	83	19
Farming	105	24
Economic Level		
Subsistence	245	56
Middle income	83	19
Affluent	61	14
Grants	48	11
Number of Previous Pregnancies		
1-3	263	60
4-6	61	14
None	114	26

The respondents reported obtaining their earth materials from different sources, including gardens around their homes (45%), the market and home (33%), while the other participants obtained theirs from friends and the wild field (Table 3).

Very few of the respondents have relatives in overseas countries that send earth materials to them for consumption. Most of the respondents send these earth materials to their relations either by post (65%) or via a friend (35%).

Table 2: Kinds of Earth materials, benefits derived and causative reasons for geophagia

Questions	*n*	*Percentage (%)*
What Kinds of Earth Materials Do You It?		
Sand	70	16
Clay	149	34
Soft stone	96	22
Wall scrapping	35	8
Termitemound	88	20
What Benefits Do You Derive from Eating Earth Materials?		
Flavour	88	20
Taste	197	45
Nicefeeling	131	30
Lessening hunger	22	5
Frequency of Eating Earth Materials		
Once a day	127	29
Several times a day	210	48
Once in a while	88	20
Hardly ever	13	3
How Much Do You Eat Earth Materials?		
10-30 g	44	10
31-50 g	53	12
51-70g	79	18
71-90g	70	16
Greater than 90g	192	44
Do You Notice Undesirable Feeling After Eating Earth Materials?		
Notice abdominal pain	48	11
No feeling of pain	390	89
How Do You Consume Earth Materials?		
Powder form	88	20
Chunk	267	61
Powder and chunk	83	19

Table 3: Distribution and ways of obtaining Earth materials

Questions	*n*	*Percentage (%)*
How Do You Obtain The Earth Materials?		
From friends	18	4
Gardens	197	45
Market	79	18
Home and market	144	33
Do You Have Relatives In Overseas To Whom You Send Earth Materials?		
Yes	18	4
No	420	96
How Do You Send The Materials?		
By post	285	65
Through a friend	153	35

DISCUSSION

The present study was designed to determine the prevalence of geophagic practice in Vhembe District, Limpopo Province, about which, no information exist. The findings of the study indicated that consumption of earth materials is high among the women in the region.

The study confirms the results of several other studies on geophagic practice (Luoba et al. 2004; Peter 2011). According to Kawai et al. (2009), the prevalence of geophagy was very high in Kenya and other parts of East Africa. These observations are similar to the findings of this study.

The practice is mostly associated with pregnant women as noted by previous studies, which had similar findings (Geissler et al. 1998; Meel 2012). This is further corroborated by earlier reports from East Africa where it appears to be widely accepted as a common practice among pregnant women (Kawai et al. 2009).

Majority of the women agreed that geophagy is mostly associated with pregnancy, especially during the second trimester. This is consistent with findings from similar researches (Prince 1999; Meel 2012). Dietary intakes of most women are mainly cereal-based rich in carbohydrates. These foods may not be able to provide the much-needed mineral supplements such as iron (Fe) and calcium (Ca), thus providing evidence for one of the reasons why geophagic practice is prevalent.

The findings of this study revealed the various types of earth materials (clay, soft stones, termite mounds and anthills) that are consumed. These earth materials are similar to those eaten by school children in parts of East Africa, Nigeria, Ghana and parts of southern Africa (Peter 2011; Meel 2012). Female geophagists in Vhembe District most frequently ate soft stone followed by clay and fine sand, compared to pregnant women in Western Kenya who ate termite mounds more frequently. The coastal women from Kenya ate soft stone probably because of the scarcity of termite mounds in the coastal areas (Luoba 2004).

A relatively small percentage of the women ate earth materials from wall scrapping in the study area. This observation is similar to the findings of studies conducted in East Africa (Kawai et al. 2009).

Several benefits were listed for consuming earth materials. The main ones were quelling the nauseate feelings due to the soothing taste of the consumed materials, the general craving due to odor the earth materials emit when it rains,

reddish brown coloration giving "blood" to women who said they had little blood, a sense of satisfaction and the lessening of hunger in some cases. These findings parallel earlier findings from studies in the Southern African region and other parts of the world where geophagy is practiced (Prince 1999; Meel 2012).

Geophagy was more prevalent amongst women who crave for earth material due to its sweet flavor and soothing taste. These properties probably help quell nauseate feelings and early morning sickness during pregnancy. The findings of Luoba et al. (2004) support the findings of this study with reference to the brownish-red color and the sense of satisfaction as some of the reasons for geophagic practice.

The majority of female geophagists ate earth materials several times a day compared to those who ate it once a day. There are few other female geophagists who ate earth material once in a while. It is stated that female geophagists from Manzini and Hhoho in Swaziland ate earth materials more than once a day as compared to those women who ate earth materials once in a day (Peter 2011). The amount of earth materials consumed on a daily basis was similar to what was reported by other researchers (Walker et al. 2005; Meel 2012). Pregnant women from the coastal region of Kenya ate an average of 41.5g on a daily basis. Women from Sierra Leone ate about 40-80g. Ghanaian women consumed 30g per day and women from western Kenya consumed between 20-108g of earth material in a day (Walker et al. 2012).

The majority of the women in the Vhembe District, South Africa did not experience any undesirable feelings after the consumption of earth materials, unlike Luo women in western Kenya who maintained that geophagy had negative consequences for them, such as abdominal pains, heart burns and worms infestations, but did not consider these to be serious health problems (Prince et al. 1999). The women further stated that they were advised by medical doctors to drink a lot of milk each time they eat the earth materials in order to defecate easily.

The methods used to consume earth materials by the women subjects in this study were mainly in the form of dry chunk and powder. According to de Jager and Ekosse (2011), traditional healers administer geophagic clays to their patients in wet or dry forms along with other medicinal herbs.

The respondents stated that they sent earth materials to relatives overseas mainly through the post office, while others send them through friends who travel overseas. The earth material known as *'sikor'* (baked clay) consumed by pregnant Bangladeshi women residing in United Kingdom is normally imported into that country (UK) by post (Al-Ramali et al. 2010). This form of importation is similar to the method used by senders in the Vhembe District in this present study.

CONCLUSION

Geophagy is widely practiced by young and old women in Vhembe District. The economic performance of these women mainly falls under the subsistence category, though there are some affluent members of the society that are involved in the geophagic practice. The types of earth materials consumed vary from one locality to the other but the most preferred type of earth material is clay, which is sold in the local market. Their preference for clay is based on its flavor and soothing taste in the mouth. The women in the urban center obtain their earth material from local shops and other retail outlets, while those in rural areas obtained their earth material from gardens around their homes.

RECOMMENDATIONS

The present study dealt with the extent of the geophagic practice and types of earth materials that are consumed. Further studies with larger sample sizes that will include geophageous female children and males of all ages in the entire Vhembe District are needed to elucidate the reasons behind this practice and its implications on their health.

LIMITATIONS

The sample in this study reflects only one area of Vhembe District. Further studies with larger sample sizes are needed. However, this is the first study to investigate the geophagy practice in Vhembe District and as such it has provided a baseline data for future studies.

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