Geophagic Practices Of The Setsing-Phuthaditjhaba Market Vendors In Thabo Mofutsanyane, Free State, South Africa

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Abstract

Geophagia is the compulsive and deliberate practice of soil ingestion and it occurs across the globe. It is mostly practised by females of developing countries marred with low income. Why people crave soil is not clear, but medicinal to religious reasons have been proposed for this habit. Geophagists believe that eating soil could provide diarrhoeal relief, detoxification, antimicrobial treatment, immune boosting and mineral supplementation. Geophagists generally demonstrate preferences for certain soils based on their colours and textures. South African geophagists generally prefer white and/or khaki coloured soils with a soft, smooth and powdery consistency. Free State soils tend to be silky, whereas those from Limpopo are gritty and powdery. The aim of this investigation was to obtain a better understanding of geophagic practices in the district of Thabo Mofutsanyane, Free State. These data were gathered through the distribution of questionnaires to soil vendors at the Setsing-Phuthaditjhaba market, which were completed with the aid of an interpreter. Observation of the environment around the study sites contributed to the findings. Two sets of questionnaires were used to gather information about geophagic practices in the district of Thabo Mofutsanyane. One questionnaire characterized geophagic habits and geophagic soils and focused on demography, socio-economic, cultural and business aspects of geophagia and was distributed to vendors who sell soil at the Setsing-Phuthaditjhaba market. The second questionnaire was used to gather additional information on the mining methods and hygiene practices during the collection of soil by vendors, also dealing at the Setsing-Phuthaditjhaba market. Setsing-Phuthaditjhaba soil vendors were generally married Sesotho-speaking women from the surrounding areas and over the age of 30. For the majority of the vendors questioned, selling of soil was a major source of income, generating approximately twenty rand per day. The majority of the customers of the vendors were women from all income groups and ages, notably ages from 21 to 30 years. Most of the customers purchased two bags of soil per day, generally priced at one rand per bag. Geophagic soil sold at the Setsing-Phuthaditjhaba market was referred to as *mobu* and sometimes as *sweets*, *dipompong* or *rama*, and mined from the wild, mountain of the Drakensburg Chain and riversides. Vendors tended to mine their own soil using clean utensils and avoiding polluted areas, although some pollution was noticed in the surrounding areas of the mines whilst visiting known mining sites in the area. Mined soils were transferred to plastic bags or containers with their bare hands. Thereafter, the vendors processed soil prior to it being sold, by pounding and drying, either through the sun or baking. This sample of interviewees provided valuable information about geophagic practices in the district of Thabo Mofutsanyane. It became clear that this practice is entrenched in the cultural behavior of the people of this area, providing much needed income for many families.

Keywords: *Geophagia, geophagic practices, geophagic soil, questionnaires, vendors, mines*

1. Introduction

Geophagia or earth-eating is the deliberate or accidental consumption of earth-like substances such as soil, clay or chalk and is classified as the most common form of pica (Halsted, 1968; Ellis and Schnoes, 2006; Broomfield, 2007; Young, *et al*., 2008). It is observed in humans and animals worldwide, particularly among people with low socio-economic status, as well as in tropical regions of the world and in tribal societies (Halsted, 1968; Callahan, 2003; Wilson, 2003; Ellis and Schnoes, 2006).

Geophagia is not a confined phenomenon, but rather a commonly accepted and widespread occurrence across the globe, including the American continents, the British Isles, Europe and Africa (Ellis and Schnoes, 2006; Brand, *et al*., 2009). In Africa, areas where the consumption of earth-like substances have been documented, include the Cameroon (Von Garnier, *et al*., 2008), Guinea (Glickman, *et al*., 1999), Kenya (Geissler, *et al.,* 1998; Luoba, *et al*., 2004), South Africa (Saathoff, *et al*., 2002; Ekosse, *et al*., 2010; Ngole, *et al*., 2010), Swaziland (Ngole, *et al*., 2010), Tanzania (Young, *et al*., 2007; Kawai, *et al*., 2009), Uganda (Abrahams, 1997) and Zambia (Nchito, *et al*., 2004). Even though the practice of human geophagia is well-known in South Africa, it appears to be more prevalent in certain areas. South African areas currently known for this practice includes the Free State (Thabo Mofutsanyane and Mangaung), Limpopo (Polokwane and Sekhukhune) and KwaZulu-Natal provinces (Saathoff, *et al*., 2002; Ekosse, *et al*., 2010; Ngole, *et al*., 2010).

The practice of geophagia is evident amongst people of different races, ages, socioeconomic classes and sexes (Hunter, 2003). However, inhabitants of poverty-stricken countries marred with low income, especially in Africa, are more commonly known for practicing geophagia, sometimes solely to relieve hunger (Young, *et al*., 2007; Von Garnier, *et al*., 2008). Although not limited by demographic and geographic boundaries, earth-eating remains more prevalent amongst children and women of child-bearing age (Vermeer and Frate, 1979; Geissler, 2000; Hunter, 2003; Brand, *et al*., 2009).

Reasons why people crave soil are unclear, but seem to range from medicinal to religious in origin, as well as constituting part of a regular diet (Halsted, 1968; Knishinsky, 1998; Reilly and Henry, 2001). Cultural, physiological and psychological grounds have been promulgated as the etiology of this peculiar habit (Geissler, *et al*., 1998; Callahan, 2003; Hunter 2003; Young, *et al*., 2007).

Many geophagists believe in the beneficial qualities of clayey soil, which include diarrhoeal relief, detoxification, antimicrobial treatment, immune booster and mineral supplementation (Knishinsky, 1998; Hunter, 2003). Many third world countries are showing an increased consumption of clay-like substances as a dietary component (Knishinsky, 1998; Callahan, 2003; Abrahams, 2005; Ellis and Schnoes, 2006).

Geophagic clayey soil properties such as colour, texture, smell and taste are carefully considered before a geophagist will indulge (Reilly and Henry, 2001; Wilson, 2003; Nchito, *et al*., 2004; Young, *et al*., 2007; Ekosse, *et al*., 2010; Ngole, *et al*., 2010; Young, *et al*., 2010). South African geophagists generally prefer geophagic clayey soils which have soft, smooth and powdery consistency (Ekosse, *et al*., 2010). More specifically, in South Africa the texture of most geophagic clayey soils from the Free State Province are silky, whilst those from the Limpopo Province are gritty and powdery (Ekosse, *et al*., 2010).

The Thabo Mofutsanyane municipality district in the Free State province, South Africa, is known for its extensive practice of human geophagia, and was therefore identified as an area for research. The aim of this investigation was to obtain a better understanding of human geophagic practices in the Thabo Mofutsanyane district.

2. Methodology

2.1. Geographic study area

Thabo Mofutsanyane district municipality is located in the eastern Free State province of South Africa and covers an area of approximately 28 400 square kilometres. A local interpreter and guide suggested the selection of the rural town of Phuthaditjhaba and the small town of Clarens, because of prior knowledge of existing mines and practicing geophagists in these towns. Indigenous knowledge and the ongoing investigations into the practice of human geophagia, has shown that particular areas are selected and revisited for geophagic practices. Vendors in Phuthaditjhaba collect their soil from areas similar to those visited by the local inhabitants who practice geophagia, or purchase their soil from traditional miners.

2.2. *Questionnaires*

A questionnaire, developed by Professor G-IE Ekosse (Walter Sisulu University, Mthatha), was used to obtain information about human geophagia practices and geophagic soils. This questionnaire addressed aspect such as demography, socio-economic and cultural aspects of vendors as well as their customers. In addition this questionnaire also addressed the commercial aspects of geophagia and the vendors' indigenous knowledge pertaining to the practice of geophagia. This questionnaire was distributed to eleven vendors in the Setsing-Phuthaditjhaba local market (Thabo Mofutsanyane municipality district), willing to participate in this study and it was completed with the assistance of an interpreter, who hailed from this area.

A second questionnaire was developed to address mining and hygiene practices of the vendors as this was not addressed in the first questionnaire. This questionnaire requested information on the vendors' methods of soil mining and the hygiene practices when obtaining geophagic soil as merchandise. The focus of the second questionnaire was to obtain data about the following: whether vendors mined their own soil; where soil was mined by vendors and the environmental conditions prevalent at the mining site; how soil was mined by vendors; hygienic practices of vendors during the mining of soil; and type of containers used for soil collection and transport. The second questionnaire was circulated in October 2009 to nine Setsing-Phuthaditjhaba market soil vendors, who were willing to participate and was completed with the assistance of an interpreter.

3. Results

From the results of the first questionnaire it was evident that vendors who sell geophagic soil at the Setsing-Phuthaditjhaba market were mostly married Sesotho speaking females, older than 30 years, from the surrounding rural settlements who have undergone some degree of secondary schooling. The majority of these vendors depended upon

the income generated from their vendor shops and stated that the selling of soil for consumption was not negatively perceived by their customers. More than 70 % of these vendors practiced geophagia themselves and cited that taste was the main reason for consuming clayey soil. The demographic, social-economic and cultural aspects of the vendors are reflected in Table 1.

Table 1: Demographic, socio-economic and cultural aspects of vendors (n=11)

Location	**Rural**	**Suburban**	**Urban**		
%	90.9	9.1	0.0		
Gender	Male	Female			
%	18.2	81.8			
Age in years	≤ 20	21-30	31-40	41-50	≥ 51
%	9.1	9.1	36.4	18.2	27.3
Ethnic group	Sesotho	isiZulu			
%	72.7	27.3			
Marital status	Married	Single			
%	72.7	27.3			
Income besides shop?	Yes	No			
%	18.2	81.8			
Level of Education	No schooling	Primary	Secondary	Tertiary	Literacy program
%	18.2	18.2	63.6	0.0	0.0
Do you eat soil/clay?	Yes	No			
%	72.7	27.3			
If yes, how often?	1/ wk	1/day	Taste		
% (n=8)	37.5	50.0	12.5		
If yes, for how long?	< 1yr	1 yr	2 yr	> 2yr	
% (n=7)	28.6	0.0	57.1	14.3	
Your reason(s) for eating soil/clay?	Craving	Medicinal	Taste		
% (n=8)	25.0	12.5	100.0		
How do others perceive the sale of soil/clay?	Positive	Negative	Indifferent	Don't know	
%	90.9	0.0	9.1	0.0	
How do others perceive the consumption of soil/clay?	Positive	Negative	Indifferent	Don't know	
%	100.0	0.0	0.0	0.0	

Vendors indicated that the commercial aspect of geophagia is very important to them, although other items were also sold to supplement income. For the larger part, vendors have been selling geophagic soil for two years or longer. On average ten to fifty bags of geophagic soil were sold per day, generating an income of approximately R20.00 (ZAR).

The majority of the customers of vendors were females from the surrounding rural settlements and from all income and age groups. More than 80 % of these customers purchased two bags of soil per day, generally priced at R1.00 (ZAR) per bag (Table 3).

Most of the vendors collected the soils themselves from the wild, mountain-and riversides, however a few indicated that they do purchase soil from a supplier. Geophagic soil sold by vendors at Setsing-Phuthaditjhaba market is traditionally known as *mobu*, but are also referred to as sweets, *dipompong* or *rama.* Customers mostly preferred whitish clayey soil, because of its taste, perceived by some as being sour.

Table 2: Importance/size of business in selling soil/clay (n=11)

Period of selling	< 1 yr	1 yr	2 yrs	3 yrs	> 3 yrs
%	18.2	18.2	45.5	9.1	9.1
How much is sold?	10 bags	12 bags	15 bags	20 bags	50 bags
%	27.3	9.1	9.1	36.4	18.2
Income per day	< R20.00	R20.00	R30.00	R40.00	> R40.00
%	9.1	54.5	18.2	9.1	9.1
Sell other items?	Yes	No			
%	100.0	0.0			
Importance of selling soil/clay?	Very important	Important	Not important		
%	100.0	0.0	0.0		

Table 3: Demographic, socio-economic and cultural aspects of geophagic customers (n=11)

Age	Under 20	21-30	31-40	41-50	51-60	60+
%	63.3	100.0	72.7	54.5	27.3	27.3
Gender	Male	Female	Both			
%	0.0	72.7	27.3			
Location	Urban	Rural	Suburban			
%	18.2	100.0	9.1			
Economic status	High income	Middle income	Low income	All income		
%	0.0	36.4	0.0	63.6		
Quantity bought?	One bag/day	Two bags/day				
%	18.2	81.8				
Cost per bag?	< R1.00	R1.00	R1.50	R2.00	> R2.00	
%	9.1	54.5	27.3	36.4	9.1	

Vendors, therefore, tend to collect mostly whitish clayey soil to satisfy customer preferences. These clayey soils are purchased by customers for personal consumption, although they often purchase clayey soil for family members as well. Vendors process and store geophagic soil before it is sold to customers. Processing of geophagic soil by the vendors include pounding and heat treatment, which comprises baking and/or sun drying. The soils are then stored in a variety of containers, more often in plastic bags, for periods ranging from two to fourteen days prior to selling (Table 4). All of the vendors who completed the second questionnaire indicated that they mined the soil from mainly rural, but also suburban areas using clean utensils and taking environmental factors, such as soil pollution, into consideration. The mined soil was transferred with bare clean hands to clean plastic bags or plastic containers. Table 5 reflects the mining and hygiene practices of the vendors.

4. Discussion and conclusion

Geophagists from the Thabo Mofutsanyane district generally consume clayey soil because of its sour taste, but also for medicinal purposes. The sourness of geophagic clayey soils results from their slightly acidic pH and is believed to alleviate nausea and ptyalism in geophagic pregnant women (Kikouama, *et al*., 2009; Ngole, *et al*., 2010; Young, *et al*., 2010).

Table 4: Indigenous knowledge on collection, preparation and selling of soil/clay (n=11)

What kind of soil/clay do you sell?	Soil	Clay	From termite mounds	Other			
%	100.0	9.1	0.0	0.0			
How do you obtain soil/clay?	Buy from supplier	Buy from other vendors	From termite mounds	From the wild	Other: mountain & river		
%	9.1	0.0	0.0	72.7	81.8		
Colour of soil/clay?	Reddish	Blackish	Khaki	Brownish	Yellowish	Whitish	Other: greyish
%	0.0	0.0	9.1	18.2	36.4	90.9	9.1
Customer colour preference?	Yes	No					
%	100.0	0.0					
If yes, what colour?	Reddish	Blackish	Khaki	Brownish	Yellowish	Whitish	Other: greyish
% (n=11)	0.0	0.0	9.1	18.2	27.3	63.6	9.1
Why is colour preferred?	Taste	Medicinal value	Other: sourness				
%	100.0	9.1	36.4				
For whom do they buy?	Themselves	Members of family					
%	100.0	63.6					
Advise on use?	Yes	No					
%	27.3	72.7					
Administration	Swallow						
% (n=7)	100.0						
Traditional name	Mobu	Sweets/ dipompong	Rama				
%	90.9	9.1	9.1				
Storage	Maize meal bag	Plastic bag	Plastic container				
%	18.2	54.5	36.4				
Storage period?	2 days	4 days	5 days	7 days	14 days		
%	18.2	9.1	36.4	27.3	9.1		
Expected consumption?	Wet	Dry					
%	0.0	100.0					
Process before selling?	Yes	No					
%	100.0	0.0					
Who does processing?	Vendor	Customer	Both	Other			
%	100.0	0.0	0.0	0.0			
Method of processing?	Pounding						
%	100.0						
Heat treatment	Yes	No					
%	100.0	0.0					
If yes, how?	Baking	Sun exposure					
% (n=11)	63.6	72.7					

Table 5: Vendor mining and hygiene practices (n=9)

Mine own samples?	Yes	No	
%	100.0	0.0	
Where do you mine?	Rural	Suburban	Urban
%	55.6	44.4	0.0
Consider environmental factors	Yes	No	
%	100.0	0.0	
With what do you mine?	Bare hands	Utensils	Other
%	0.0	100.0	0.0
For above is it:	Clean	Unclean	
%	100.0	0.0	
With what is sample transferred?	Bare hands	Utensils	Other
%	88.9	11.1	0.0
For above is it:	Clean	Unclean	
%	100.0	0.0	
Collection container?	Plastic bag	Box	Other: plastic container
%	66.7	0.0	33.3
For above is it:	Clean	Unclean	
%	100.0	0.0	

The shop merchandise of different Setsing-Phuthaditjhaba vendors, (Thabo Mofutsanyane), includes pre-packed bags of geophagic clayey soil, weighing approximately 200 grams per bag. When the investigation was initiated the mean price of these bags was R1.00 (ZAR) per bag, however, upon subsequent visits to the Setsing-Phuthaditjhaba market, vendors sold these bags at a mean price of R2.00 (ZAR) per bag. The sale of clayey soil, which forms an integral business component of their vendor shops, contributes to sustaining their livelihood. Different people of a community are usually involved in the geophagia value chain, often as a means of subsistence. The existence of traditional miners, vendors and geophagists within a single community has led to many business opportunities sprouting from geophagia. Several vendors at local markets in African countries (Uganda, Tanzania and Zambia) generate income through the sale of geophagic soils to geophagists (Abrahams, 1997; Hooda, *et al*., 2002; Nchito, *et al*., 2004).

Geophagic materials across the African continent are diverse in origin. Vendors from the Thabo Mofutsanyane district mine geophagic clayey soil themselves from the mountain-and riversides in the wild, whereas geophagists from, for example, Kenya and Tanzania select soils from termitaria (Geissler, *et al*., 1998; Luoba, *et al*., 2004, Young, *et al*., 2010). Existing geophagic mining sites visited in the Thabo Mofutsanyane district were mostly located within small embankments in close proximity to footpaths and/or public roads. Clayey soils from the Thabo Mofutsanyane district are traditionally called *mobu* (also referred to as sweets, *dipompong* or *rama*) by local geophagists, whereas geophagic soils from other African countries are traditionally known by different names, including *odowa* (Kenya), *ufue*, *mchanga* or *udongo* (Tanzania) (Geissler, *et al*., 1998; Luoba, *et al*., 2004, Young, *et al*., 2010).

Mainly whitish geophagic clayey soils were sold by the Setsing-Phuthaditjhaba market vendors. The whitish colour seems to impart a desired palatability preferred by the majority of the geophagic customers. This concurs with the results of Ekosse, *et al*., (2010), in which Free State Province geophagists indicated a preference for white and khaki coloured clayey soils. Interestingly, whitish clayey soils contain kaolin and smectite clay minerals, which possess numerous gastro-intestinal benefits (Wilson, 2003; Dominy, *et al*., 2004; Gomes, *et al*., 2009; Bisi-Johnson, *et al*., 2010; Young, *et al*., 2010). However, after comparison to the Munsell Soil Color Charts, these whitish-perceived clayey soils sold by the Setsing-Phuthaditjhaba vendors, were classified as being mostly greyish in colour, whilst the colour of all the soil samples collected in this study ranged from greyish, to yellowish, to brownish. This is supported by earlier findings where South African geophagic soils were classified as yellowish to greyish in colour (Ngole, *et al*., 2010). The Munsell classification of freshly mined topsoil and excavated soil from geophagic sites in the Thabo

Mofutsanyane district generally revealed a brownish colouration, which may be attributed to the fact that these soils have not undergone any processing or heat treatment.

Setsing-Phuthaditjhaba market vendors interviewed, maintained that detrimental environmental factors were considered when selecting appropriate mining sites, and that hygiene practices, such as using clean hands and mining utensils, were also applied during the mining of clayey soil. Contrary to this information, it was observed during this study that the immediate surroundings of many existing geophagic mining sites were contaminated with municipal waste and even cattle dung. Mining techniques and hygiene practices incorporated by geophagists when collecting geophagic clayey soil may vary. Often, very basic utensils are incorporated for soil collection and may include broken bottles, sharpened sticks and shovels (Ekosse, *et al*., 2010). A metal plate, concrete shard, broken bottle neck and sticks were some of the picking utensils observed at a few of the geophagic mining sites studied in the Thabo Mofutsanyane district. Generally, most of these mines were already excavated at an average depth of approximately 20 cm, which confirms the discriminating criteria (such as burrowing underneath the soil surface) adult geophagists apply when seeking clayey soil (Vermeer and Frate, 1979; Hunter, 2003; Young, *et al*., 2007).

The interviews with the Setsing-Phuthaditjhaba vendors revealed that the majority processed geophagic clayey soil before selling it, through pounding and heat treatment, which involved oven baking and/or sun drying. Typically geophagic clayey soil often undergoes some degree of processing prior to consumption, which may include pounding, grinding, slurrying and various heat treatments (Ekosse, *et al*., 2010). Heat treatment of clayey soil is believed to enhance physical properties, including taste and colour and also reduce potentially pathogenic temperature-sensitive micro-organisms present in these soils (Reilly and Henry, 2001; Hunter, 2003; Ekosse, *et al*., 2010; Young, *et al*., 2010).

Even though this was a small sample of interviewees, it did provide valuable information about the geophagic practices in the Thabo Mofutsanyane district. It became evident that this practice is entrenched in the cultural behaviour of the people of this area, providing a much needed income for many households.

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