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Original Research Article

## Is Geophagia a Health-Seeking Behavior or an Ethnic Remedy towards Greater Personal Resilience?

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**Objective:** We investigated if Geophagia was a health-seeking behavior or a socio-cultural remedy towards enhanced personal resilience. **Method:** We used a sample size of 2,000 with 90% power to detect an effect size of 30% at significance level of 5%. We randomly selected one or more district, municipality or metropolitan area from each of the 10 regions (Rosemary and Valadez, 2013). We randomly selected one or more communities from each of that and then use the random walk method to evaluate households within each community till the quota for the region was met (Milligan, et al., 2004). Regional comparisons were made possible due to the stratified and random selection of representations that were similar in characteristics such as being urban or rural, then ethnicity, religion and gender. We obtained Ethical Approval to conduct the assessment. **Result:** The result shows that Geophagia is a cultural nutritional reality which is practiced widely in Ghana. It also appears to be a health-seeking behavior that seems to enhance the resilience of the practitioners against certain health challenges. **Discussion:** The research on Geophagia needs to be reconsidered without any prejudicial biases to reflect the true cultural and health reasons for it. **Conclusion:** Geophagia is not a result of food insecurity or food scarcity. It is a nutritional habit which may require more than the presence of food to break it.

**Keywords:** Geophagia, Health-Seeking behavior, Socio-Cultural justification, Resilience, Mental Illness

### INTRODUCTION

Geophagia is also known as pica, which is defined as the eating of non-nutritive substances for a reasonable duration without aversion to food. <sup>[1]</sup> It can also involve the ingestion of other material such as ice (pagoghagia). The practice is now common in many nations of the world, irrespective of economic status. <sup>[2]</sup> For example, it is practiced in the United States of

America, in Germany, in Turkey and other parts of Asia, and in Australia among the Aborigines, as well as Eastern Africa, West Africa and in Southern Africa. <sup>[3-10; 2;11-13]</sup> As a personal resilient measure or part of adaptive capacity, Woymodt and Kiss (2002:143) have suggested that geophagia was an artifact

of poverty, that “where poverty and famine are implicated, the earth may serve as an appetite suppressant and filler”.<sup>[14]</sup>

At other times in the published literature, though, Geophagia appears to be a cultural activity designed to address a specific health need amongst the populations that practice it. Some of the health needs are nausea, morning sickness and anti-diarrheal treatment.<sup>[2; 10-11]</sup> Although there are other allopathic as well as homeopathic alternatives to a wider segment of the population for nausea, morning sickness or diarrhea in today’s globalized world of pharmaceuticals, the selection of clay, shale or rock as prophylactic seems to be a matter of choice and culture.<sup>[14]</sup>

Many reasons and causes have been ascribed by social research scientists to Geophagia. Other researchers have reported that Geophagia is a sign of neurosis or that the practitioners are considered to have a psychiatric disorder.<sup>[15; 3-11; 2]</sup>

Woymodt and Kiss (2002) observed that it is “environmentally and culturally driven” among others. That is to say, geophagia is part of the cultural norms of the people who practice it. Due to the inference that those who practice geophagia are perhaps suffering from mental infirmities, the question of capacity begs to be answered. When capacity is viewed from the western medico-legal and ethical point of view in the context of what constitute good nutrition and good health-seeking behavior, it does not address the question as to whether those practicing geophagia do in fact have the capacity to discern good from bad.<sup>[16; 14]</sup> The question of capacity arises from the Western industrial medico-legal ethics.<sup>[16]</sup> Western ethical framework places the individual as the central entity around whom all other activities revolves.

The concept of autonomy naturally arose from the centrist positioning of the individual as a free entity in society whose actions are motivated by his or her own desires, subject to the limitations placed by societal maxims and rules.<sup>[17]</sup> Unlike capacity/autonomy in the western world, in Ghana and many developing nations, the question of capacity is considered a communal value. It does not evolve out of a single individual.<sup>[16]</sup> Sivalingam (2011) argued that in Malaysian culture, the family’s autonomy supersedes that of the individual.<sup>[16]</sup> There is obviously a conflict between the western ethical precepts of autonomy and capacity and the understanding for these concepts as held in the traditional and cultural societies.<sup>[17; 18]</sup> Sen (1992) and Nussbaum (1993) defined capacity as a “person’s ability to do valuable acts and reach valuable state of being”.<sup>[19; 20]</sup>

Therefore, by inference the assessment of Geophagia has to be contextual and site specific.<sup>[20]</sup> Our research focused first on answering the inquiry if Geophagia was a health-seeking behavior, that is to say, a socio-cultural remedy towards enhanced personal resilience status. We further inquired if Geophagia was a dietary supplement like chocolate or popcorn was to others. Although all the authors are public health practitioners in nutrition, epidemiology, law and policy as well as medicine, we did not conduct the research from our personal health-seeking behavioral lenses but conducted the study purely as an empirical research to understand the reasons for geophagia in modern day Ghana and other nations similarly situated.

## METHOD

We were confronted with the difficulty of knowing beforehand the communities in Ghana that practice Geophagia. Thus, targeting only the commonly known ones was not enough in determining prevalence nationwide. Targeting only pregnant

women might also give a higher prevalence rate and limit the study just to them due to the practice’s wide association with pregnancy. We decided to target women of reproductive age in order to estimate the prevalence for a wider group. We also expanded this to include men since very little is known about the practice in men, although the practice is common in the generally known sites in Ghana. In the end, we targeted pregnant women, women in general and men in order to estimate the prevalence for a wider group. We assumed 20% of persons in Ghana practiced Geophagia based upon a pilot study conducted in Ashaiman, near Tema Municipality, Ghana.

This was part of a broader study on assessing the resilience of four communities within Ghana and to identify the coping mechanisms to the observed effects of climate variability. This was done by asking respondents if they had ever willingly eaten earth or clay. The proportion who said yes was used to estimate the prevalence (Please see questionnaire as attached as Appendix). This yielded sample size of 1710 with 90% power to detect an effect size of 30% at 5% significance level. A sample size of 2000 gave a reasonable degree of security against the effects of decline in response and prevalence rate. We randomly selected one or more district, municipality or metropolitan area from each of the 10 regions.<sup>[21]</sup> We randomly selected one or more communities from each of that and then use the random walk method to evaluate households within each community till the quota for the region was met.<sup>[22]</sup> Regional comparisons were made possible due to the stratified and random selection of representations.

We investigated if geophagia was an artifact of poverty or an appetite suppressant activity and socio-cultural factors sustaining the practice. We targeted pregnant women, other women and men in order not to skew prevalence rate in favor of pregnant women due to the practice’s wide association to pregnancy.

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We searched through national legislation and grey paper to identify national food and nutritional guidelines or standards for the evaluation and to assess their nexus to geophagia. Due to the paucity of literature on the subject, we were only able to access the Food and Drug Act and the National Nutritional Policy. We also reviewed newspaper reports on geophagia as part of the build-up for the design of the study instrument. We conducted internet searches and accessed journal papers on the topic from databases such as PubMed, MEDLINE and Goggle Scholar. The Goggle search alone on Geophagia yielded 83,000 results of which many were not relevant to the topic, but selected those that directly related to our topic and

used in this paper. The documentary search on the internet was conducted using carefully designed phrases like, "Geophagia, a cultural nutritional artifact," "Geophagia in Ghana, benefits and risks," "Cultural beliefs, red earth eating and well-being". We summarized the findings into their respective units, and interpreted them. We applied for Ethical Approval to conduct the study for which approval was granted.

### Study Area

The study covered the 10 administrative regions of Ghana as shown in Table 1. Communities used for sampling within each municipality or district in each of the 10 administrative regions.

### Data Processing

Data was entered into Microsoft Excel 2007, checked for accuracy and consistency to reduce errors.<sup>[23]</sup> This was then transferred into Stata version 11.0 MP for analysis.<sup>[24]</sup> Summary statistics such as frequencies, percentages, means and standard deviations were then estimated to compare the prevalence of geophagia across the various groups and backgrounds. Chi-square and Fisher's exact tests were used to explore association between the prevalence of geophagy and background characteristics, history and its practice. Significant factors from the tests of association were then used in logistic regression to estimate the relative odds of such relationships.

### Study Limitation

Many of the papers used in this write-up; were the results of research conducted on small groups of people. We attempted to document the practice of geophagia nationwide. Despite, due to limited funds, we could not collect data to allow the comparison between urban and rural areas for each region. Urban-rural comparison was done at the national level.

Despite this observation, we believe that the methodology used in this study was sound. We also covered the entire 10 administrative regions of Ghana using GSP to map the locations of the practice. We believe the sample size is large enough to allow us to generalize the outcome in for Ghana. In order to access the true prevalence rate of geophagia in West Africa, a much bigger study needs to be undertaken in the future due to the practice's linkage to pregnant and lactating women, which is a global health concern.

## RESULTS

### RESULTS FROM THE LITERATURE REVIEW

#### *Ethnic Remedy and Resilience tool against food scarcity and disease*

It has been found that Geophagia or clay eating is a cultural-nutrition health-seeking behavior for pregnant and lactating women in many emerging economies.<sup>[2, 13]</sup> However, the practice is not entirely limited to ethnic people in the emerging economies. Abrahams, Davies, Solomon et al.'s study population was concentrated in a small portion of the nation. Geophagia is practiced also in many other places in the world.<sup>[15, 3-10, 12-13]</sup> Going by Woymodt and Kiss' (2002:143) suggestion that "where poverty and famine are implicated, the earth may serve as an appetite suppressant and filler", Geophagia appears to be an aspect of resilient building or adaptive capacity against food insecurity and food scarcity.<sup>[14-15]</sup> Others assert it may also be an instinctive response to

gastro-intestinal disturbances.<sup>[6, 12-13]</sup> Since Geophagia is related to nutrition in the broader sense, there are implications in climate change and adaptation on the conduct.

### Geophagia and Nutrition

Although Geophagia is related to nutrition, it is not only about nutrition. The national policy on nutrition does not even mention Geophagia as a minor health concern; let alone a public health. Despite this observation, the document raised alarm about the deplorable and declining nutritional qualities of the various national diets, irrespective of climate Change. According to the Draft (National Food) Nutrition Policy, 2011:12):

*"The nutritional situation of the people of Ghana has shown a downward trend over the past few years. The high prevalence of malnutrition and sub-optimal nutrition reported in the various age groups has come about primarily as a result of poor quality and quantities of their diets."*

If poor quality of nutrition is an issue, won't the quality of dietary supplements also be part of the issue? In the national ecosystem, there is evidence of malnutrition, disorders and diseases among infants, young children and pregnant women.<sup>[25]</sup> This is particularly worrisome when viewed against the rising food prices and the effects of rapid urbanization and climate change, all of which increases the economic shocks. In such a situation, it is understandable that households may result to traditional means for mitigating nutritional related threats.<sup>[26]</sup> Vulnerable communities are the same everywhere.

They differ in the intensity of the threats they face and in their capacities to exercise dominion over such threats, shocks and stresses. With respect to climate change, for example: communities, social groups, sectors, regions and nations differ in their degree of vulnerability.<sup>[26, 27]</sup> Other factors control how well a community, social group, sectors, regions and nations would react to a given stressor, such as social capital, human capital, psychosocial factors, social networks, wealth, formal institutions, and the environment. This is what researchers call differential vulnerabilities within the resilient dimension.<sup>[28]</sup>

### *Differential Vulnerability and the National Food and Nutrition Policy*

Yaro (2010) described differential vulnerabilities and impacts to mean the absence of parity in the distribution of the cumulative national resources and wealth. Within the same region, it is noticed that adaptive capacity and vulnerability varies from one household to the other. Due to such variations, there is the need to consider poverty and inequality or access to differential resources and wealth as key to climate change interventions including nutrition status of a community, society or a nation.<sup>[26, 28]</sup> Good nutrition is the 'sine qua non' of good health outcomes.

Good nutrition is dependent on good agricultural and farming practices and ethics.<sup>[29]</sup> Yaro (2010) identified the main categories of vulnerable groups as widows, disabled, aged, children, youths, divorced women, and the poor in general.<sup>[26]</sup> As reported in this paper, we also found among the group practicing geophagia in Ghana that, (37.9%) were those who were divorced, separated or widowed, as compared to only (18.7%) of married couples, (17.8%) of those cohabiting and (11.2%) of those who were never married (P<0.001), which is significant.

**Table 1:** Study on Geophagy in Ghana – Communities used for sampling

1.	REGION District/Municipality	Communities
2.	GREATER ACCRA Dangbe West	Abekope, Abia, Abonya, Abuviekpong, Adakope, Adjumadjan, Adumanya, Afienea, Agbekotsekpo, Agortor, Ahwiam, Alikope, Amanakpo, Ametafor, Apese No.1, Apese No.2, Asebi, Asilevikope, Asutsuare, Atabui, Atrobinya, Avakpo, Ayernya, Ayetepa, Ayikuma, Buerko, Dawa, Dawhenya, Dawhenya NewSite, Dedenya, Djorkpo, Dodowa, Domanya, Dorymu, Duffor, Dzogbedzi, Fiakonya, Forkpe, Gbesemi, Gighedokum, Gozankope, Henyum, Ho, Huapa, Kadjanya, Kadjanya, Kenekope, Kewum, Klebuse, Kodiabe, Kolikpo, Kongo, KoniKabl, Konkontekope, Kopodor, Kortorkor, Kpatsiremidor, Kpohe, Kpongunor, Lakpleku, Lekpongunor, Lorlorvor, Lotsubuer, Luom, Mampong Shai, Mangochonya Agomeda, Mataheko, Minya, Moble, Nakope, Natriku, Natriku, New Ningo, Ngmetsokope, Nigeria, Nyigbenya/Tsopoli, Odumase, Old Ningo, Omankope, Okuedzor, Osuwem, Otenkope, Oyikum, Pukper, Saihe, Shai Hills, Somey, Sota, Tachikope, Tokpo No.1, Tokpo No.2, Tsumkpo, Volisvo, Zugbanyateng, Zutsukpo
3.	ASHANTI Bekwai Municipal	Abenkyim, Abodom, Achiase, Adjamesu, Adjemasu, Aduam, Affulkrom, Akwatebeso, Akyeremade, Amanhyia, Amoaful, Ankaase, Anwiankwanta, Anwiankwanta, Anyanso, Anyinam, Apaaso, Asakyiri, Asamang, Asankare, Asanso-Kyeyewere, Asanso-Patasi, Asokore, Atuagebie, Bedomase, Bekwai, Betinko/Kyeyewere, Biribiwomang, Boagyaa-Besease, Boagya-Odumase, Boamang, Bodoma, Bogyawe, Boni-Behenase, Chiransa, Chiransa, Daa, Denyasefokrom, Dominase, Dotom, Dwoamin, Dwumakro, Ehwiren, Esiasse, Essankwanta, Essumeja, Esumeja, Etwereso, Fereso No.2, Feyiasse, Gyasikrom, Hunatado, Juaso-Manso Asuboa, Kensere, Kokofu, Kokofu-Aboaso, Kokofu-Edwinase, Kokotro, Koniyaw, Kortwia, Kurase, Kwabena-Nkwanta, Kwamang, Manfokrom, Medoma, Mensase, Monnor, Nerebehi, Nkyekyem, Ntinankor, Ntroaku, Ofoase-Kokoben, Oseikokrom, Pepedan, Poano, Sanfo, Sarfo-Krom, Sehwi, Senfi, Sesekro, Sumkyekrom, Tweapease, Wioso, Yapesa
4.	BRONG AHAFO Jaman North	Duadaso No.1, Duadaso No.2, Jamera, Kogyei, Old Drobo, Sampa, Suma-Ahenkro
5.	CENTRAL Abura-Asebu-Kwamankese	Abakrampa, Aboenu, Abura-Dunkwa, Akonoma, Amosima, Asebu, Asebu Ekroful, Asuansi, Ayeldu, Batanyaa, Brafoyaw, Edumifa, Katayiasse, Moree, New Ebu, New Odonase, Nyamedom, Nyanfeku-Ekroful, Obohen, Obokor
6.	EASTERN East Akim Municipal	Akim Apapam, Apedwa, Asafo, Asiakwa, Bunso, Kibi, Kukurantumi, Maase, Nkronso, Old Tafo, Osiem
7.	NORTHERN Gushiegu	Bulugu, Gaa, Geluwe, Gmanicheri, Katali, Kpatinga, Limo, Nabuli, Nawuhugu, Nayogu, Pumo, Salwa, Samang Yapala, Samanga, Samtemo, Shintoli, Tintang, Watugu, Wawwo, Zamanshiju, Zantili, Zinindo, Zori
8.	UPPER EAST Bulsa	Awchana-Yeri, Chiok-AlongaYeri, Chuchuliga Central, Fumbisi, Fumbisi-Baansa, Fumbisi-Naadem, Fumbisi-Kasisa, Gbedema-Jagsa-Garibiensa, Gbedema-Kunkwak, Kanjarga-Jiningsa, Korri Alabyeri, Moteesa-Sinyangsa, Sandema-Fiisa, Sandema-Kandema-Kawansa, Sandema-Nyansa, Siniensi-Kaasa, Sinyangsa-Badomsa I, Waga Central
9.	UPPER WEST Wa Municipal	Boli, Busa, Charia, Kolpong, Kperisi, Kpong, Mengwe Gorpie, Wa (Capital)
10.	VOLTA Ho Municipal	Abutia-Kloe, Abutia-Teti, Amedzofe, Anyirawase, Asanti-Kpoeta, Atikpui, Dededo, Dzolo-Gbogame, Ho (Capital), Klefe Achatime, Shia, Sokode Gbogame, Takla Gbogame, Tsibu, Tsito, Ziavi-Dzogbe
11.	WESTERN Nzema East Municipal	Aiyinase, Akpandue, Asanta, Asasetere, Awebo, Axim, Azuleloanu, Bamiankor, Basake, Eikwe, Esiana, Gwira Bansa, Kamgbunli, Kikam, Menzenzor-Kakebenzele, Nkroful, Nsein, Sanzule, Tandan, Teleku Bokazo

### **Nexus between Geophagia and Resilience apropos food scarcity**

If, somehow, geophagia contributes to a practitioner's resilience in the time of food scarcity and poor health, then it is imperative to understand the connection to resilience and tease out the synergy or nexus between geophagia and resilience: **shocks** - (food insecurity/ rising food prices) – **stresses** -(illness/ pregnancy/ morning sickness) – **clay** - (eating) = **resilience** – (nausea ends/wellbeing/feel good). Resilience is a pliable, malleable concept that it is defined variously by different actors and players particularly in the donor-aid-development-humanitarian intervention stratosphere.

For starters, we consider Martin-Breen & Anderies's (2011:2) definition as applied in climate change analytics as:

*“the capacity over time of a system, organization, community or individual to create, alter, and implement multiple adaptive actions in the face of unpredictable climatic changes”.*

It involves “increasing the capacity of an individual, community or institution to survive, adapt, and grow in the face of acute crises and chronic stresses”.<sup>[30]</sup> Resilience has also been applied in engineering, child development and in complex adaptive systems. In psychology, the concept of resilience has been used in child development and survival. Contemporarily, it had become an inter-disciplinary concept which is treated in

areas such as disaster planning and organizational management and governance. It has application in economics, history, and innovation in technology, and urban planning.<sup>[30]</sup> USAID funded program, *Resilient Africa Network* (Higher Education Solutions Network) defines resilience to mean 'the capacity of people and systems to mitigate, adapt to, recover and learn from shocks and stresses in a manner that reduces vulnerability and increases wellbeing'.<sup>[31]</sup>

In this paper, we define resilience as the systematic implementation of our collective aims to exercise dominion over the known and controllable shocks and stresses that threaten or destabilize us in a manner that underscores our collective primacy and wellbeing over the ecosystem in which we live.

The question begging to be answered is does the eating of clay or shale improve the lives of the practitioners making them more resilient against illness of nausea, morning sickness during pregnancy and so on? The answers lie in the outcomes reported in the result section which appears to be supporting the theory that it does, as seen from the lens of the practitioners. The linking of Geophagia to food security and consequently to the observed adverse effects of climate change is because food insecurity is a chronic event in the emerging and poor communities and economies in which geophagia is prevalent.<sup>[2]</sup>

### ***Geophagia as a health-seeking behavior***

If Geophagia is a food insecurity measure, could Geophagia also be a health-seeking behavior? According to various published papers, the data seem to suggest that Geophagia is a culturally sanctioned activity between relatives, husbands and wives, as well as the children in the household that practiced it.<sup>[32]</sup> The result suggests that it is not driven by poverty or the lack of formal education or the presence of gainful employment. The respondents said:

(N=312) '**they like the smell** (31.7%); '**it reduced spitting** (22.1%); '**they like the taste** (17.3%); '**it reduced vomiting** (9.3%); '**curiosity** (5.8%); '**other reasons** (5.5%); '**treat nausea** (3.9%); '**treat diarrhea** (2.6%); and '**prevent heartburn** (1.9%)'.

These responses were given by a mixed group of respondents including pregnant women. We need to understand why this practice is common not only among pregnant and lactating women but the other groups as well. This is particularly so in vulnerable communities and populations exposed to chronic and occasional shocks and stresses such as famine, food scarcity, rising cost of daily staples such as grains, cooking oils and protein sources. Although not conclusive, research appears to be settling the debate against the practice in the affirmative that it is a vehicle for the delivery of toxic material such as lead and mercury, helminthes and other bacteriological threats.<sup>[12-13]</sup>

### **CONCLUSION OF THE LITERATURE REVIEW**

From the literature review it seems malnutrition is an outcome of either inadequate food or inadequate access to food, coupled with other confounders such as disease, poor distribution of health services and other resources. However, Geophagia is not a result of food insecurity or scarcity but a nutritional habit which may require more than the presence of food to break it.

## **RESULTS FROM THE CROSS-SECTIONAL QUANTITATIVE DATA ANALYSES**

### ***Geophagia as an artifact of poverty***

From the background of the respondents (n=2000) in Table 2, we noticed that the practice of geophagia was highest within the 50-59 year age group (21.5%) and lowest within the under-20 year olds (9.8%) and this was significant at 5%, ( $P<0.05$ ). It can also be seen that the practice is more predominant among females (26.2%) which was also highly significant at 0.1%, ( $P<0.001$ ) as shown in Table 2 below.

It was found that those divorced, widowed or separated, although in real terms were only 29 in number, they had the highest prevalence (37.9%) compared to those married who were 942 in real terms but only (18.7%) prevalence. In terms of the occupations of the respondents with a higher propensity for geophagia, it was noticed that the practice was highest with those with "Sales and Services" job (27.8%) as compared to "Skilled Craftsmanship" (14.4%) or "Professional/Managerial" (2.9%), "Agriculture" (18.6%), "Unskilled Labor" (15.9%) and "Clerical/Secretarial" was (13.2%) all of which were significant ( $p<0.001$ ).

This result seems to suggest that Geophagia is not an outcome of poverty, but a habit or a cultural phenomenon just like getting up in a western capital and dousing one's body with chemicals such as a cup of coffee. In the case of the finding made in "Sales and Services" cohort, the high number of geophagists in that group could be attributable to the stressful nature of sales and marketing work or in the provision of services to, perhaps, ornery customers. It could be, we assume, a homeopathic solution to an occupational risk of stress induced nausea. In fact among those employed, (16.7%) of them practiced geophagia compared to only (11.5%) of the unemployed.

### ***Wealth and type of Residence as measures for Geophagia***

We found that wealth was not a measure for the practice and the type of residence did not influence the practice as seen in Table 3 and 4 below.

### ***Odds of Practising Geophagia***

We noticed that males were 88% less likely than females to practice geophagy, OR (95% CI) = 0.12 (0.09, 0.17),  $P<0.001$ . This was still significant at almost the same level after adjusting for the other variables in the model (Table 5), i.e. after taking those other characteristics into account. Among the age groups, 50-59 year olds were most likely (2.51 times) to practice geophagy compared to the under-20 year olds.

However, this was not significant after adjusting for the other variables although they were still the most likely group to do so, OR (95% CI) = 2.90 (0.88, 9.58),  $P=0.555$ . Sales and Services staff who see regular monthly income were 2.04 (1.09, 3.82) times more likely to practice geophagia compared to those in agriculture with odds ratio of 1.21 (0.60, 2.46) which was significant with ( $P=0.001$ ). Employed respondents were 1.54 times more likely compared to the unemployed ( $P<0.01$ ).

### ***Whether geophagia was an appetite suppressant activity***

We found the following responses as to why a section of the respondents engaged in geophagia in Fig 1. We did not isolate any response that supported the theory that Geophagia was an

**Table 2:** Background of respondents and the practice of geophagy

Characteristic	No. of subjects	No. (%) who've ever practised geophagy	Chi-square, P-value
Age (years)			11.31, P<0.05
<20	244	24 (9.8)	
20 – 29	697	108 (15.5)	
30 – 39	461	72 (15.6)	
40 – 49	377	67 (17.8)	
50 – 59	144	31 (21.5)	
60+	72	12 (16.7)	
Mean±SD	33.3±12.8	35.2±13.0	
Sex			183.57, P<0.001
Female	1,049	275 (26.2)	
Male	948	39 (4.1)	
Marital status			30.58, P<0.001
Never married	840	94 (11.2)	
Married/Cohabiting	1,127	209 (18.5)	
Divorced/Separated/Widowed	29	11 (37.9)	
Religion			16.03, P<0.01
None	93	25 (26.9)	
Christian	1,409	212 (15.1)	
Muslim	416	58 (13.9)	
Traditional African	73	19 (26.0)	
Highest education			105.80, P<0.001
None	75	26 (34.7)	
Primary	565	145 (25.7)	
Secondary	1,074	135 (12.6)	
Tertiary	282	8 (2.8)	
Employment status			6.25, P<0.05
Not employed	375	43 (11.5)	
Employed	1,619	270 (16.7)	
Occupation			80.47, P<0.001
Unskilled labour	82	13 (15.9)	
Agricultural	167	31 (18.6)	
Clerical/Secretarial	53	7 (13.2)	
Professional/Managerial	274	8 (2.9)	
Sales and services	454	126 (27.8)	
Skilled craftsmanship	589	85 (14.4)	
Total	2,000	314 (15.7)	

(Adopted from Norman ID, Binka FB, Godi, TN. (2015). Geophagia: A cultural-nutrition health-seeking behavior with no redeeming psycho-social qualities. South Eastern European Journal of Public Health, SEEJPH 2015: 38-48. DOI 10.12908/SEEJPH-2014-38)

appetite suppressant. The reasons for eating earth by respondents who practice geophagy (N=312):

(N=312) '**they like the smell** (31.7%); '**it reduced spitting** (22.1%); '**they like the taste** (17.3%); '**it reduced vomiting** (9.3%); '**curiosity** (5.8%); '**other reasons** (5.5%); '**treat nausea** (3.9%); '**treat diarrhea** (2.6%); and '**prevent heartburn** (1.9%)'.

### **Geophagia is culturally sanctioned activity**

There was ample evidence to support the assertion that geophagia is a culturally sanctioned activity, which in some cases, included the indulgence of the entire family. It also shows increased craving when pregnant.

**Table 3:** Background of respondents and the practice of geophagy

<b>Characteristic</b>	<b>No. of subjects</b>	<b>No. (%) who've ever practised geophagy</b>	<b>Chi-square, P-value</b>
Ethnicity			40.27, P<0.001
Akan-Ashanti	438	57 (13.0)	
Akan-Fante	208	23 (11.1)	
Akan-Other	265	70 (26.4)	
Ewe	206	33 (16.0)	
Ga-Dangbe	138	28 (20.3)	
Mole-Dagbani	252	28 (11.1)	
Grussi/Gur	155	31 (20.0)	
Nzema	140	27 (19.3)	
Other	148	16 (10.8)	
Region of residence			94.78, P<0.001
Ashanti	388	45 (11.6)	
Brong Ahafo	185	14 (7.6)	
Central	179	17 (9.5)	
Eastern	213	76 (35.7)	
Greater Accra	324	37 (11.4)	
Northern	201	29 (14.4)	
Upper East	85	18 (21.2)	
Upper West	57	13 (22.8)	
Volta	173	27 (15.6)	
Western	192	38 (19.8)	
Type of residence			2.20, P=0.138
Urban	1,546	233 (15.1)	
Rural	451	81 (18.0)	
Length of stay at current residence (years)			18.12, P<0.001
<5	920	115 (12.5)	
5 – 9	605	99 (16.4)	
10+	466	99 (21.2)	
Length of stay at current community (years)			11.72, P<0.01
<5	366	43 (11.8)	
5 – 9	386	48 (12.4)	
10+	1,239	221 (17.84)	
Total	2,000	314 (15.7)	

**Table 4:** Background of respondents and the practice of geophagy (continued)

<b>Characteristic</b>	<b>No. of subjects</b>	<b>No. (%) who've ever practised geophagy</b>	<b>Chi-square, P-value</b>
Wealth quintile			7.62, P=0.082 <sup>a</sup>
Lowest	12	3 (25.0)	
Second	286	47 (16.4)	
Middle	401	63 (15.7)	
Fourth	664	119 (17.9)	
Highest	622	79 (12.7)	
Ever had biological children			57.37, P<0.001
No	924	84 (9.1)	
Yes	1,071	230 (21.5)	

No of biological children ever had			5.95, P=0.203
1			
2	273	50 (18.3)	
3	232	49 (21.1)	
4	172	40 (23.3)	
5+	139	26 (18.7)	
	243	64 (26.3)	
Ever heard of geophagy			83.39, P<0.001 <sup>a</sup>
No	365	0	
Yes	1,631	314 (19.3)	
Ever witnessed geophagy			97.14, P<0.001 <sup>a</sup>
No	413	0	
Yes	1,584	314 (19.8)	
Related to people seen practising geophagy			85.12, P<0.001
No	388	14 (3.6)	
Yes	1,195	300 (25.1)	
Total	2,000	314 (15.7)	

a. Fisher's exact p-value where cell frequencies are low (<5).

**Table. 5** Relative odds of practising geophagy based on background characteristics

Characteristic	Crude		Adjusted	
	OR (95% CI)	P-value	OR (95% CI)	P-value
Age (years)		P<0.05		P=0.558
<20	1		1	
20 – 29	1.68 (1.05, 2.69)		2.34 (0.85, 6.45)	
30 – 39	1.69 (1.03, 2.77)		2.32 (0.79, 6.86)	
40 – 49	1.98 (1.20, 3.26)		2.68 (0.89, 8.08)	
50 – 59	2.51 (1.41, 4.49)		3.06 (0.94, 9.94)	
60+	1.83 (0.87, 3.88)		3.00 (0.73, 12.33)	
Sex		P<0.001		P<0.001
Male	1		1	
Female	8.28 (5.84, 11.74)		7.73 (4.99, 11.96)	
Marital status		P<0.001		P=0.348
Never married	1		1	
Married/Cohabiting	1.81 (1.39, 2.35)		1.34 (0.88, 2.06)	
Divorced/Separated/Widowed	4.85 (2.22, 10.58)		1.87 (0.44, 8.03)	
Religion		P<0.01		P<0.05
None	1		1	
Christian	0.48 (0.30, 0.78)		0.59 (0.32, 1.12)	
Muslim	0.44 (0.26, 0.75)		0.44 (0.23, 0.86)	
Traditional African	0.96 (0.48, 1.92)		0.91 (0.38, 2.20)	
Highest education		P<0.001		P<0.01
None	1		1	
Primary	0.65 (0.39, 1.09)		0.87 (0.44, 1.70)	
Secondary	0.27 (0.16, 0.45)		0.50 (0.24, 1.03)	
Tertiary	0.06 (0.02, 0.13)		0.17 (0.05, 0.59)	

Employment status		P<0.01		
Not employed	1			
Employed	1.54 (1.10, 2.18)			Omitted due to collinearity
Occupation		P<0.001		P=0.512
Unskilled labor	1		1	
Agricultural	1.21 (0.60, 2.46)		0.96 (0.42, 2.20)	
Clerical/Secretarial	0.81 (0.30, 2.18)		1.08 (0.34, 3.42)	
Professional/Managerial	0.16 (0.06, 0.40)		0.64 (0.20, 2.03)	
Sales and services	2.04 (1.09, 3.82)		1.37 (0.69, 2.75)	
Skilled craftsmanship	0.90 (0.47, 1.69)		1.33 (0.65, 2.73)	

**Note:** The category "Male" is now the referent group for the variable "Sex" and for the variable "Marital status", "Married" has been merged with "Cohabiting"

**Table 6:** Knowledge, history and practice of geophagy among respondents who have ever been pregnant

Knowledge, history and practice	N	%
Geophagy is practiced only by pregnant women	41	19.3
Craving to eat earth only present when I'm pregnant	119	56.1
Craving for earth stronger with my gestational age	205	96.7
Stage during pregnancy when craving mostly begins		
Early	17	8.0
Midway	16	7.5
Throughout	85	40.1
I practice geophagy to show others when I'm pregnant	21	9.9
I have same desire to eat earth when not pregnant	89	42.0
My desire to eat earth is stronger when pregnant	206	97.2
I always eat earth when pregnant	207	97.6
Children taught to eat earth		
None	158	74.5
Male(s)	1	0.5
Female(s)	40	18.9
Both	12	5.7
Ever pacified a child with earth to keep quiet	64	30.2
Culturally acceptable within locality to openly eat earth		
No	30	14.2
Don't know	84	39.6
Yes	98	46.2
Currently living with partner	166	78.3
Partner aware of earth eating	171	80.7
Partner in agreement of geophagy	86	40.6
Partner partakes in geophagy	22	10.4
Parents ever ate earth		
No	8	3.8
Don't know	52	24.5
Yes	152	71.7

Parent who ate earth Mother	152	71.7
Total	212	100.0

### **Geophagia as resilience measure**

Though there is no direct evidence that eating earth made the respondents stronger, it can be inferred that the reason for eating earth was the expectation that they would be stronger and more resilient to be able to face the challenges of pregnancy, such as reduced nausea, spitting, and improve wellbeing. In terms of improving the resilience of the geophagists in relation to their health outcomes, there is evidence from the dataset to suggest that this was achieved.

Although the study did not measure the scale of resilience the respondents alleged garnered, it is reasonable to conclude that the sustainability of the practice was dependent on the benefits derived from its application. At worst, there was psychosocial benefit, even if there was no physical outcome.

### **DISCUSSION**

We began this paper with a polemic that, perhaps, western literature is contemptuous of Geophagists. We asserted that it appeared it considered the practice as an artifact of poverty and the practitioners, primitive and disease ridden. We suggested that perhaps, there is social misdiagnosis of the conduct and its implications to the practitioners. Guided by our objectives to find out if Geophagia was a health-seeking behavior or a socio-cultural remedy towards enhanced personal resilience status, we carried out our investigations. We are contended with the initial assertion since the outcome of this investigation has provided us the justifications to affirmatively support that assertion. We have already submitted in both the literature review and the results section of this paper that:

1. Geophagia is both a cultural activity designed to address a specific health need amongst the indigenous populations that practice it. It has nothing to do with being anything else other than what the practitioners consider it to be: a cultural nutritional reality that helps them to feel good.
2. As a health-seeking behavior, it works in the same way that salted biscuits may work for pregnant women in the western consumer driven economies to fight nausea and morning sickness in the early stages of pregnancy.
3. It is also a habit forming oral satisfaction just as popcorn or chocolate or 'saltine biscuits' eating is.
4. It appears the approach to Geophagia research needs to be redesigned to bring out the best in the science and in culture about the subject. Researchers have also reported that Geophagia is a sign of neurosis. In other literature, Geophagists are considered to have a psychiatric disorder.<sup>[15]</sup> This study did not assess the psychiatric situation of the respondents.
5. What we can address is that, geophagia is part of the cultural norms of the people who practice it.<sup>14</sup> Granted the attributes of capacity differ from one socio-political system to the other much in the same way that well being is appreciated subjectively. Geophagia as a

normative, nutritional equivalent of well being of the communities and households that practice it, can be understood from the lens of those communities and households only and not from western nutritional paternalistic lens. Granted, even within the same nation there are dissimilar cultural norms and standards among the different economic and social groupings. Geophagia, according to the literature appears to be illustrative of poor determinants of nutrition and health. In terms of nutrition and food education and health promotion, it appears the public health nurse or medical doctor has an uphill battle to contend with in Ghana. The National Food and Nutrition Policy (2011:30) reported that the population is reticent about embracing good and healthy ways of cooking the traditional cuisine.<sup>[25]</sup> "Records from the MOH indicate that intestinal and food borne diseases leading to abdominal illness is a predominant occurrence. The practice of food hygiene to preserve the quality of food and prevent contamination and food borne diseases is not satisfactory right from the household level through boarding institutions and the general public. This applies to the handling of fresh foods from farm gate to processing at the household level. There are so many cultural and traditional practices which contribute to this state of affairs."<sup>[25]</sup> They prefer to prepare meals in the ways of old, without regard to good hygiene and healthy diet.<sup>29</sup> Perhaps, the presence of toxic material such as lead and mercury, helminthes and other bacteriological threats to geophagists cannot be attributable to just the practice of geophagia.<sup>12-13</sup> Perhaps, the cause of such agents in a segment of the population is due to the overall poor farming and agricultural practices, poor food and personal hygiene as well as the overwhelming lack of a good environmental practice in Ghana.

6. Geophagia as a personal search for greater health resilience against illness and disease by the practitioner demands that to reduce the differential vulnerabilities of the populations thus affected, government needs to create a more equitable distribution of the national wealth and resources. We need to understand what the communities practicing geophagia are faced with and the magnitude of the challenges. We need to identify the opportunities available to them to overcome the shocks and stresses that drive them towards geophagia and the social support network universally present to all, including social capital, wealth, the ecosystem within which they live, governance, psychosocial support and human capital.

### **CONCLUSION**

More research needs to be done to understand the cultural burden of Geophagia, isolate it from the forensic toxicology research in order to fully understand the practice and assess the benefits, if any.

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