PREVALENCE OF PICA PRACTICES AND ASSOCIATED FACTORS AMONG PREGNANT WOMEN ATTENDING ANTENATAL CARE CLINIC AT PCEA KIKUYU HOSPITAL

BY

OTIENO ISAAC O GALLO

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SUPERVISORS: DR. ALICE M. MWANGI

DR. GEORGE OOKO

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COLLEGE OF AGRICULTURE & VETERINARY SCIENCES

FACULTY OF AGRICULTURE

DEPARTMENT OF FOOD SCIENCE, NUTRITION & TECHNOLOGY

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DECLARATION

I, Otieno Isaac Ogallo, hereby declare that this is my original work and has not been presented for a degree in any other college, university or learning institution.

Sign……………………………… Date……………………………………

Otieno Isaac Ogallo

This report has been submitted for examination with supervision and approval of:

Sign……………………………… Date……………………………………

Dr. George Ooko

Sign……………………………… Date……………………………………

Dr. Alice M. Mwangi
DEDICATION

This piece of work is dedicated to the entire Ogallo family for their support and encouragement throughout my study, to my son Arlene Desirēe Chiwoh Otieno and to my late sister, Lynette Adhiambo.
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I acknowledge the Department of Food Science, Nutrition and Technology for the overwhelming support during the four years of study that has equipped me with knowledge.

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ABBREVIATION
PCEA-Presbyterian Church of East Africa

MUAC-Mid Upper Arm Measurements

Hb-Heamoglobin

cm-centimetres

g/dl-grams per deciliter

wk-week

WHO-World Health Organization

SPSS-Statistical Package for Social Science

X²-Chi-square

P-Probability of getting a value in a population as high as the value obtained in the sample
DEFINITION

Pica - the ingestion of non-food substances that persist for more than one month at an age where eating such objects is considered developmentally inappropriate.

Gestational period - the period of pregnancy.

Trimester - stages in pregnancy consisting of three months span.

Chelator - a substance that binds other substances.

Hyperkalemia - excess potassium in the blood stream.

Toxociariasis - soil-borne infection.

Hepatomegaly - liver enlargement.

*Ascaris lumbricoides* - parasites found in the soil (hook worm).

*Trichuris trichuria* - parasites found in the soil (hook worm).

Amylophagia - excessive consumption of starch.

Geophagia - excessive consumption of soil.

Corprophagia - excessive consumption of animal feaces.

Mucophagia - excessive consumption of mucus.

Pagophagia - excessive consumption of ice.

Urophagia - consumption of urine.

Trichophagia - consumption of hair or wool.

Lithophagia - consumption of stones.

Polyphagia - consumption of more than one substance.
ABSTRACT

The prevalence of pica practice in different populations has been studied, and the evidence shows that it is a common practice in developing countries. In spite of this, it is has remained unabated. In Kenya, the information is scanty. Furthermore, there are no studies that state whether health care providers assess women for pica practices during pregnancy despite literature reports indicating harmful health outcomes.

The objective of this study was to determine the prevalence of pica practices and associated factors among pregnant women attending antenatal care clinic at PCEA Kikuyu Hospital.

The study site was PCEA Kikuyu hospital. The study involved 74 participants with a mean age of 26 (±4.8) years. All women attending the antenatal care clinic and were in their second and third trimesters were recruited into the study until the desired sample size of 74 was achieved. The sample size was determined using Fischer’s formula.

The data collection equipment included a detailed semi-structured questionnaire, mid-upper arm measuring tape. The data collected were analyzed using SPSS.

The majority of the respondents had similar socio-demographic characteristics. 56.8% of the women practiced pica. Types of substances consumed were soft stones followed by soil, charcoal, frozen ice cube, paint chips and toothpaste.

The association between pica practice to dietary pattern and nutritional status of the participants was determined using chi-square test. The results showed that there was no significant difference between them.

Most of the women stated that they practice pica due to cravings which they were unable to explain.

Pica practice was significantly high among the subjects. This suggests that questions about the presence of pica should be raised routinely in antenatal clinics. However, pica practice is a complex phenomena, therefore, there is need to conduct a longitudinal study in order to substantiate the findings of this study.
CHAPTER 1

1.0 INTRODUCTION

1.1 Background

Pica, the ingestion of non-food items, has aroused the curiosity of medical personnel since at least the 16th century (Parry, 1992). Pica in children has been studied extensively, but pica during pregnancy remains understudied and underreported (Lopez et al., 2004). Articles exploring the practice (Lacey et al., 1990) have been contradictory and present little conclusive evidence about its cause and prevalence. Pica during pregnancy is a worldwide phenomenon that has been studied largely in the United States with an occasional report from the Midwest (Vermee and Farell, 1985).

The prevalence of pica in pregnant women has been reported from as low as 8% to as high as 68% in the various groups studied (Smulian, 1995). In general, pica behaviour is probably underreported because ingestion of non-food items may be seen as either shameful or merely unimportant and normal (Sayetta, 1986). A study published in 1994 found that 8.1% of pregnant African-American women in the U.S self-reported pagophagia, the ingestion of large quantities of ice and freezer frost (Edwards et al., 1994). Another study conducted in 1991, found the prevalence of pica among pregnant women in Saudi Arabia to be 8.8% (Al-Kanhal et al., 1995). Rates of pica among pregnant women in developing countries can be much higher with estimates of 63.7% (Nyahurucha, 2009) and 74% (Ngozi, 2008) reported for two different African populations. The prevalence of clay, soil or dirt consumption among pregnant women ranged from 65% in Kenya (Luoba et al., 2004), 46% in Ghana (Vermeer, 1971) and 42% in Namibia (Thomson, 1997).
Suggested risk factors also vary between studies. A meta-analysis of dirt, clay, and starch eating women found that race was the major risk factor for pica during pregnancy. It was four times higher in black women than white women (Kolasak et al., 1991). A study by Edward et al. (1994) however, found no significant racial difference in the prevalence of pica in rural obstetric populations; instead, childhood, family and non-pregnant history played a role. The meta-analysis also indicated that rural women were twice as likely as urban residents to exhibit pica practice and that lower socio-economic status, greater maternal age, impaired nutritional status, and a childhood or family history of pica were additional risk factors.

The etiology of pica practice appears to be complex (Lacey et al., 1990). Many environmental, nutritional, socioeconomic, physiologic, cultural and psychiatric causes have been postulated. Some women apparently practice pica for medicinal purposes. For example in Nigeria clay has been shown to contain kaolinite and to act as a potent antidiarrheal; it binds toxins and bacteria and may form a protective coat on the intestinal epithelium (Lopez et al., 2004). Culture can also play a role in pica practice; for example, if it encourages specific dietary practices and indulgence of cravings (Ngozi, 2008). Majority of women believed that eating soil gives energy, tastes nice, makes women feel strong and makes stomach full. These women also believed that eating soil protects the unborn baby from poison, gives nutrients to the unborn, prevents prolonged labor and stops morning sickness (Giessler at al., 1999).

Theories concerning possible nutritional deficiencies as a cause of pica practice are abundant, with many researchers including vitamin and mineral deficiency in the list of suggested risk factors. There are data linking deficiencies with food preferences in animals, but this has never been documented in humans. Dietary differences between women who do and those who do not engage in pica practice have not been conclusively documented (Horner, 1991).
One of the most widely postulated causes of clay and dirt pica is iron-deficiency anemia. The contemporary opinion on mineral deficiency is polarized between Horner and colleagues’ (1991) view that anemia may be a consequence of pica rather than a cause, and the more historical evidence that mineral replacement therapy cures pica practice (Moore and Sears, 1994).

Certain items possess a strong sensory attraction for women who practice pica. A study by Edward et al (1959) described women who liked the odour, the taste or texture of clay or cornstarch. It indicated that there was a connection between liking the taste of the cornstarch and enjoying its texture in the mouth. Cooksey describes a phenomenon of olfactory craving that escalates during pregnancy (Cooksey, 1995). A heightened taste and odour in some women during pregnancy have also been reported (Bhatia and Puri, 1991).

The medical consequences of pica practice for mother and foetus vary with the nature of substance ingested (Bernstein, 1997). Effects on the mother include dental injury, constipation, intestinal obstruction, dysfunctional labour due to feecal impaction, parasitic infections, toxemia, interference with the absorption of minerals, lead poisoning and hyperkalemia (Kolasak, 1991). Possible effects on the foetus include prematurity, perinatal mortality, low birth weight, irritability, decreased foetal head circumference, and exposure to chemicals such as lead, pesticides, and herbicides (Horner, 1991).

According to Global Health Council (2008) myths and misunderstanding of eating nonfood items lead to serious health consequences. For example, some pregnant women in rural Kenya eat soft stones to satisfy their cravings for iron. Experts believe that these stones can cause kidney and liver damage if not taken with enough fluid, since they can form a mass that cannot be excreted. They point out that these cravings have been in part due to long running traditions that women
have followed. Researchers state that pregnant women having these cravings are better off eating a balanced diet than remaining hooked to the myth that their changing bodies need soft stones and soil (Ndong, 2008).

1.2 Problem statement
Pregnant women should practice appropriate eating habits and consume foods that promote their health and that of the fetus. In spite of this, the habit of consuming non-food items among pregnant women continues to prevail unabated in developing countries. In Kenya information about pica prevalence is scanty. This has led to a reported increase in teratogenic risks and birth side effects during pregnancy. The causes of these side effects have often been misdiagnosed. Unless a nationwide investigation on pica practice is conducted, these pregnancy risks might contribute to high infant morbidity and mortality.

1.3 Justification
Medical consequences of pica practice for mothers and fetus increase depending with the amount, the frequency and nature of the substances ingested (Bernstein, 1997). By identifying the suggested risk factors that lead to pica practice, medical consequences posed to the mother and the fetus during pregnancy will significantly reduce, hence the need to carry out the study on prevalence of pica practice and its associated factors.

1.4 Aim
The aim of this study is to contribute towards improvement of the maternal nutrition of pregnant women in Kenya.

1.5 Purpose
The purpose of this study is to generate information that would be used in improving strategies for dealing with pica practice among pregnant women in a healthy way.
1.6 Main objective
The main objective of this study is to determine the prevalence of pica practices and associated factors among pregnant women attending antenatal care clinic care at PCEA Kikuyu Hospital.

1.7 Specific objectives
Specific objective are;

1. To determine the socio-demographic characteristics of the study women.
2. To determine the dietary pattern of the study women.
3. To determine the nutritional status of the study women.
4. To determine the prevalence and types of pica practices among the study women.
CHAPTER 2

2.0 LITERATURE REVIEW

2.1 Introduction
The term pica comes from the Latin word for magpie, a bird that is reputed because of its unusual eating behaviors. It is known to eat almost everything and shows an indiscriminate preference for foods and nonfoods (Thyer et al., 2007). In the 13th century, pica was referenced by the Greeks and Romans, however, it was not addressed in a medical book until 1563 (McLoughlin, 1987). Researches on eating disorders in the 16th to 20th centuries, suggest that during that time in history, pica was regarded more as a symptom of other disorders rather than its own specific disorder. However, according to Merriam Medical Dictionary, pica is the persistent craving and compulsive eating of substances such as chalk or ashes that are not normally eaten. It is characterized by an appetite for substances largely non-nutritive (Lopez et al, 2004). Melian, 1981 considers pica as a regular and excessive ingestion of nonfood items that have no nutritional value and suggests that pica should be treated with intensive dietary counseling.

Individuals who practice pica have been reported to ingest a wide variety of nonfood substances, including but not limited to clay, dirt, sand, stones, pebbles, laundry starch, coal, chalk, paper, paint chips, toothpaste and soap. The New York Times Health Guide, groups pica practice into subtypes according to the substances ingested. They include: amylophagia, excessive consumption of starch; corprophagy, consumption of animal feces; geophagy, consumption of clay, soil, or chalk; mucophagia, consumption of mucus; pagophagia, consumption of ice; urophagia, consumption of urine; trichophagia; consumption of hair or wool and lithophagia, consumption of soft stones. For these actions to be considered pica, they must persist for more
than one month at an age where eating such objects is considered developmentally inappropriate (Blinder et al., 2008).

Although pica can occur in individuals of any background, it is not limited to any culture, race or sex or socio-economic status. A higher incidence is associated with pregnancy, development delay and mental retardation, psychiatric disease and autism, early childhood, poor nutrition or low blood levels of iron and other minerals, and certain cultural or religious traditions (Rose et al., 2000).

2.2 History of Pica Practice

In the United States around 1800s, geophagia was a common practice among the slave population (Rose et al., 2000). Early description of the habit was given in Aristotle and Hippocrates. One of their concerns was the danger of consuming excessive quantities of cold or iced water and snow (Walker, 1997).

The Roman physician Soranus described how pica was used for the alleviation of subsequent symptoms and the unpredictable appetite in pregnancy, which can include a strong desire for extraordinary items of food. He noted that the need began around the fortieth day of pregnancy and persisted for some four months or more. He reasoned that the damage from the substance which satisfied the desires in an unreasonable way could harm the fetus as well as the stomach (Jackson, 1988). In the 6th century AD, Aerius, Royal Physician to Justinian I, presented the first documented description of pica associated with pregnancy (Coltman, 1969).

In the 18th century when it was learnt that the Sultan of Turkey ate special clay from the island of Lemnos, the Europeans quickly adopted the product as health food (Deustch, 1977).
Soil eating, though more prevalent within African countries, is practiced globally. In Nepal, women in the villages, especially pregnant women, commonly consumed some of the mud used to plaster their houses (Hunter, 2007).

2.3 Global Prevalence of Pica Practice

Prevalence of pica is difficult to establish because of differences in definition and reluctance of patients to admit to abnormal cravings and ingestion (Blinder et al., 2008). Prevalence rates vary from place to place and has been reported to range from 8% to 68% depending on the characteristic of the population studied (Smulian, 1995).

In a study involving 553 urban pregnant women, African-American women (Edwards et al., 1994) reported that 8.1% of their respondents practiced pagophagia. No geophagia was reported. A similar low prevalence rate of 8.8% involving geophagia and pagophagia was documented by Al-Kanhal and Bani in 1995 in a study involving 321 pregnant Saudi Arabian women. Other investigators who reported low pica prevalence rates include Smulian et al., (1995) who documented 14.4% prevalence in a sample of 125 women from rural obstetric population in Columbus, USA; and Walker et al., (1995) who recorded 2.2% and 1.6% prevalence rates respectively from the Indian and Caucasian pregnant women.

Halsted, (1968) summarized findings from research studies that have reported prevalence of pica ranging from 10% in young white children in a given clinic to 75% in a group of pregnant African women. African women in low socio-economic groups were considered by Halsted to have pica prevalence of approximately 40% to 50% with lower rates in white women.

Hook, (1978) using an ecological perspective, presented pica as an example of craving that has been extensively investigated. Hooks study involved a personal interview with 250 women. Ice
cream was reported as the item most frequently craved (18.4%). Non-nutritive items including river bank chalk were reported by only 1.6% of study’s participants.

Some studies carried out in western societies reported high prevalence rates in their subjects. Lacey, (1990) for example, recorded 38.0% prevalence in a study involving 128 antenatal women in Greenville, USA. He documented that African-American women reported practicing pica more than other ethnic groups in their study. Also, about 8.6% of respondents reported practicing polyphagia, that is, the ingestion of more than one substance. Similar rates were recorded by Simpson et al., (1994) whose study revealed a prevalence of 44% and 31% pica respectively in two groups of low-income women born in Mexico.

Highest prevalence rates involving mainly geophagia were reported in studies carried out in African countries. Walker et al., (1985) reported 38.3% and 44% pica prevalence rates respectively among the urban and rural South African pregnant women in their study. In Nigeria, Sule and Madugu (2001) documented 50% pica prevalence among pregnant women in Zuria. In Jamaica, a study on the dietary habits of rural women during pregnancy, noted that 15 out of the 38 pregnant women questioned reported cravings. Common cravings included; stone (20%), cigarette ash (13.3%), and drinking soda (13.3%) Melville and Frances, (1992).

2.3.1 Prevalence of Pica Practice in Kenya

In Kenya, published works on pica prevalence in pregnant women are scant. Among 275 pregnant women, 56% reported eating soil regularly in Kilifi (Giessler et al., 1998). Later study involving 52 pregnant women attending antenatal clinic at Kilifi District Hospital, 73% reported practicing geophagia and found it to be a common practice among the study population (Giessler., 1999). Ngozi, (2008) investigated pica practices of pregnant women at Pumwani
Maternity Hospital. Seven hundred and ninety three participants (74.0%) reported practicing pica regularly. Luoba et al., (2004) investigated geophagy among pregnant and lactating women in Bondo District, western Kenya. Among 827 pregnant women recruited, 378 were eating earth, of which most (65%) reported earth eating before pregnancy. The preferred type of earth eaten was soft stone, known locally as ‘odowa’ (54.5%) and earth from termite mounds (42.8%). The prevalence remained high during pregnancy, and then declined to 34.5% and 29.6% at 3 and 6 months post-partum respectively.

2.4 Causes of Pica Practice

The cause of pica behavior has eluded researchers for centuries. Seyetta, (1968) describes several theoretical approaches that attempt to explain etiology from nutritional, sensory, physiologic, neuropsychiatric, cultural or psychosocial perspectives.

2.4.1 Nutritional theories

Nutritional theories are most commonly cited, which attribute pica to specific deficiencies of minerals, such as iron and zinc. Many studies describe patients with low iron and zinc levels whose pica behavior diminishes with iron and zinc replacement, although the empiric evidence for zinc is less convincing than it is for iron. Pica may be body’s natural response to a nutritional depletion or when the body is deficient in certain minerals and vitamins. The body tries to get these minerals by causing strange dietary cravings. However, not every person with pica has a nutritional deficiency. It is postulated that red clay, earth soil, and stone are used because of their high iron content, although clay has been shown to be iron chelator and can aggravate the problem (Fisher et al, 1994)
Crosby, (1976) citing the study of Coltman, (1969), proposed that pica is a symptom of iron deficiency. He estimated that more than 50% of the patients with iron deficiency practice pica of one kind or another. However, clinical studies have been unable to ascertain whether pica is the cause, or the result of particular deficiencies (John and Duquetts, 1991). Ingested soil or clay can chelate iron or displace nutrients thereby contributing to the development of deficiency (Mukhobo, 1986). The theory is supported by some studies which report a rapid resolution of the eating following iron therapy (Korman, 1990). However the exact relationship between iron deficiency and pica remains unclear (Mokhobo, 1986; Johns and Duquette, 1991).

Those who do not have access to food may develop pica eating practices. In order to avoid the feelings associated with starvation, pica may be an option.

2.4.2 Sensory and Physiologic theories

The sensory and physiologic theories center on the finding that many patients with pica say that they enjoy the taste, the texture or smell of the item they are eating. They use these items to alleviate nausea and feel a sense of fullness while trying to lose weight. Instead of eating food items which are absorbed into the system as calories, they choose nonfood items that pass through the system without being absorbed. This way they can fill full, but they do not gain weight. While this might not begin as a compulsion, continued practice may turn into pica eating disorder.

Certain items possess strong sensory attraction for women who practice pica. Edwards et al., (1959) described women who liked the odour, the taste, or texture of clay or cornstarch. There was connection between liking the taste of cornstarch and enjoying its texture in the mouth. Cooksey, (1995) describes a phenomenon of olfactory craving that escalates during pregnancy.
Knox et al., (1994) reported that Belfast women experiencing heightened olfactory sensitivity during pregnancy had substantially more cravings than did women who had no change in the sense of smell. Researchers in several countries have reported heightened taste and odor sensitivities in some women during pregnancy (Bhatia, 1991).

2.4.3 Neuropsychiatric theory

Neuropsychiatric theory is supported by the evidence that certain brain lesions in laboratory animals have been associated with abnormal eating behaviors, and it is postulated that pica might be associated with certain patterns of brain disorder in humans (Bateson and Leroy, 1978). Pica eating disorder is often seen in those with lower psychological functioning, as in pervasive developmental disorder, autism, mental retardation and other brain disorder or brain abnormalities. This theory suggests that persons with developmental disabilities cannot tell the difference between food items, and will therefore eat nonfood items when they are hungry and food is not available. However, scientific studies have failed to validate this theory. In a study, William and Wilkins, (1995) documented that pica eating disorder occurred in up to 25% of mental retarded patients who were institutionalized and occurred in 60% of those with autism.

2.4.4 Cultural or Psychosocial theory

Psychosocial theories surrounding pica have described an association with family stress and social attention. Edward et al., (1964) found that pagophagia was associated with a smaller social support network, and they hypothesized the behavior to be a method of alleviating stress. In addition, many pregnant women in that study stated that eating freezer frost or ice helped during stressful times.
Some women in Mexico practiced pica for religious reasons. They consumed the Virgin of Guadalupe made from holy clay to get blessings (Ellen et al, 2000). These cultural norms encourage pica, and can become compulsive. Such practices may stem from health benefits such as the ability of clay to absorb plant toxins and protect against toxic alkaloids and tannic acids. Some women know that eating clay would benefit the baby by clearing out its intestinal tract so that it would be born clean (Marc, 2005).

2.4.5 Addiction or Addictive behavior

Addiction has also been suggested as one of possible explanation for pica behavior in some patients. The evidence to support this view is that pica often persists after the physiologic cause is alleviated (Parry, 1992). Some women become addicted to their pica. They report “withdrawal” consisting of a “fall in blood pressure and sweating”. Some get nervous and forced to access the items they craved for (Simpson et al., 1994). If iron deficiency leads to pica, the pica behavior should cease once iron is replaced. Cessation of pica behavior with iron replacement does not happen often. However, it was difficult to associate pica practice due to addiction or simply a learned pattern of behaviour (Edward et al., 1994).

2.5 Complications of Pica Practice

The effects of pica for mother and fetus vary depending on the nature of the substance ingested (Bernstain, 1997).

2.5.1 Effects to the mother

The effects on the mother could include inherent toxicity, obstruction, excessive caloric intake, nutritional deprivation, parasitic infection, dental injury, constipation, dysfunctional labor due to
physical impaction, interference with absorption of minerals and hyperkalemia (Horner, 1991; Rothenberg, 1999; Edwards et al., 1994).

Inherent toxicity includes direct toxic effects of substances ingested such as lead or other heavy metals (Blinder et al., 2008). Physical manifestation of lead poisoning can include both neurologic and gastrointestinal symptoms. Neurologic symptoms include irritability, lethargy, headache, cranial nerve paralysis, seizure, coma and death while gastrointestinal symptoms include constipation, abdominal pain, colic, vomiting, anorexia, and diarrhea.

Mechanical bowel problems are caused by eating nonfood items, especially rocks, hair, and dirt. This can lead to severe constipation, bowel inflammation, ulcerations, perforations, and obstructions may occur due to ingesting substances that are indigestible or as a result of numerous parasites (William, 1979)

Toxocariasis is the most common soil-borne parasitic infection associated with pica and can lead to fever, hepatomegaly, malaise, cough, myocarditis, encephalitis, retinal lesions and loss of vision. Geophagy is also speculated to be a risk factor for helminthes infection. Helminth infections affect over 1 billion people in tropical developing countries and contribute to severe morbidity. Women who practice geophagy may be particularly at risk of infection with *Ascaris lumbricodes* and *Trichuris trichuria* by ingesting eggs from contaminated soil. Items such as clay, soil and grass, can be home to parasites. When these items are ingested, parasites can then infect gastrointestinal tract causing pain, weight loss and other side effects. Hard substances like stones, clay, or ice can cause serious damage to the teeth. These substances can corrode the enamel and one might experience broken and fractured teeth.
Excessive calorie intake is generally related to amylophagia, ingestion of corn or laundry starch. This can cause excessive weight gain and also lead to malnutrition since starch is filled with “empty calories” lacking in vitamins and minerals. Caloric deprivation might occur with pagophagia or any other substance that is low or empty in calories but filling in capacity. Nutritional deprivation is caused by eating nonfood substance such as clay instead of nutritive foods (Luoba et al., 2004).

Hyperkalemia was noted in a renal failure patient who ate sandstone (Graffith, 1994). Pica of stone can lead to excess potassium in the bloodstream. Stone bind potassium in the intestines resulting into severe hyperkalemia myopathy (Horner, 1991).

Ellis and Schnoes (2002) indicate that pica practice is associated with significantly lower maternal hemoglobin levels at delivery, while Crosby, (1976) proposed that pica is a symptom of iron deficiency. However, clinical studies have been unable to ascertain whether pica is the cause, or the result (Johns and Duquetts, 1991). An American study (Edward et al., 1994) investigated pagophagia in more than 500 pregnant African-American women. The study found out 8.1% prevalence. These pregnant mothers had significantly low blood iron levels than mothers who did not eat ice. Therefore, the causation between pica and anemia still remains unclear (Mokhobo, 1986).

2.5.2 Effects to the fetus

Unfortunately, pica practice can cause serious harm to the foetus. Eating nonfood items can prevent the body from absorbing the proper minerals and nutrients. Consumption of non-nutritious foods can also interfere with healthy eating habits resulting in deficiencies in vitamin and mineral level in pregnant women. This could mean that the fetus is not receiving the proper
nutrition, increasing the risk for a variety of complications, including low birth weight, preterm labor and still birth. Other possible effects on the fetus might include prematurity, perinatal mortality, irritability, decreased fetal head circumference and exposure to chemicals such as lead pesticides and herbicides (Kolasaka et al., 1991).

2.6 Diagnosis of Pica Eating Disorder

Discovery of pica in a particular patient can be difficult in the absence of complications that might signal such eating patterns, diagnosis depends on self-reporting. Patients are likely to underreport pica’s behavior because of embarrassment or because they are not aware that such behavior might be worth reporting. More often, the diagnosis is made when the patient has complications, such as anemia, lead poisoning, intestinal obstruction or other metabolic conditions. Even in patients who have these complications, the diagnosis could be easily missed without a high degree of suspicion. Physicians should give patients suspected of pica behavior a thorough physical examination, looking for the above findings, and should obtain blood test, such as complete blood count, peripheral smear for eosinophilia, iron level, ferritin level, lead level, electrolytes and liver function test. Abdominal radiographs might be necessary to evaluate for intestinal obstructions from parasites. Even when armed with all these tests, the diagnosis of pica requires that the patient admit the behavior, because all these chemical findings are non-specific (Rose et al., 2000).

When evaluating pica, pregnant women should be interviewed about dietary habits and pica behavior. An open discussion with the patient about favorite food, followed by specific questions about ingestion of non-food substances, might aid in diagnosis (Singh, 1981).
2.7 Treatment of Pica Eating Disorder

Treatment of pica will often depend on the cause and type of pica. It may also vary by patient (child, developmentally disabled, pregnant woman or psychotic). Conventional medical treatment may be appropriate in certain situations. For example, supplementation with iron-containing vitamins has been shown to cause the unusual cravings to subside in some iron-deficient patients. Iron deficiency may be treatable by increasing iron intake through dietary changes. An initial approach often involves screening for, and, if necessary, treating any mineral deficiencies or other comorbid conditions (Edward et al, 1964). Iron supplements are often used to reduce pica (Rose et al., 2000). Pica is also treated effectively with zinc supplements. In an institution in North Carolina, 54% of residents with known pica behavior were found to have low zinc levels. After supplementation, pica behavior decreased from 23 incidents to 4-3 incidents per person across a 2 week period (Lefts et al., 1990).

Medical complications and health threats, including high lead levels, bowel perforation or intestinal obstruction, will require additional medical management, beyond addressing the underlying issues of pica. However, previous reports have cautioned against the use of medication until all non-psychotic etiologies have been ruled out (Fotoulaki et al., 2007).

Since most cases of pica do not have an obvious medical cause, treatment with counseling, education, nutritional management, psychosocial, environmental and family guidance approaches can be used. These approaches are more successful and more appropriate than treatment with medication. Other successful treatments include mild aversion therapy (associating the pica behavior with bad consequences) and where the patient learn through positive reinforcement of which foods are good and which ones they should not eat (McAdam and Sherman, 2004).
Alternative treatment techniques include; presentation of attention if pica is as a result of social attention, family guidance approach if pica is as a result of family stress. If pica is as a result of obtaining a favorite item, a strategy may be used where the person is able to receive the item or activity without eating inedible items. If pica is away for a person to escape an activity or situation, the reason why the person wants to escape the activity should be examined and the person should be moved to a new situation. If pica is motivated by sensory feedback, an alternative method of feeling that sensation should be provided (Blinder and Salama, 2008).

2.7.1 Prognosis of Pica

Treatment success of pica varies greatly according to the type and amount of substances ingested. The extent of presenting side effects and complications of pica can be reversed once the behavior is stopped, while other complications, including infection and bowel perforation, pose significant health threats and if not successfully treated may result in death. In many cases, the disorder lasts several months, and then disappears on its own. Pica frequently ends spontaneously in young children and pregnant women. Untreated pica may, however, persist for years, especially in persons with mental retardation and developmental disabilities. Individuals with history of pica are more likely to experience it again. Counseling and nutritional education can reduce the risk of recurrence (Woosley and Monika, 2002).
CHAPTER 3

3.0 METHODOLOGY

3.1 Study Site
The study was based at PCEA Kikuyu Hospital. The hospital is owned by Presbyterian Church of East Africa and is incorporated within under Presbyterian Foundation. It is one of the oldest hospitals in Kenya, having been founded in 1908 by Scottish missionaries. The aim of the missionaries was to educate the young boys and girls as health workers among other objectives. Growing only slowly over the years from its beginning as a small first aid Centre, the hospital received a boost in 1975 from President Jomo Kenyatta, who seconded medical staff to the hospital from the Government. In the same year, the first ophthalmic work was done at the newly founded Eye unit. The Eye unit expanded rapidly, and with a building of a new Eye ward there was an increase in beds available for medicine and surgery. In 1993, specialist Diabetes Unit was established. It later evolved into comprehensive rehabilitation center. It serves patients from East and Central Africa and also trains medical personnel in eye care. This has made Kikuyu Hospital known well beyond the country's border.

The hospital is situated 25kms from the centre of Nairobi in Kikuyu Division, Kiambu District and 3kms from Kikuyu Town. It draws most of its patients from the surrounding area of over a million of people.

However, the hospital has four main wards: male, female, paediatric, and maternity. In-patients numbers are usually around 100. Services offered include: out-patient services, maternal and child health care, casualty, dental services, ophthalmic care and orthopedic rehabilitation among others.
Antenatal Care Clinic offers antenatal care to expectant mothers. The health of pregnant women is monitored, maintained and optimized to ensure a healthy pregnancy, safe delivery and post-delivery periods. The clinic helps to detect problems during pregnancy and address them so that they do not affect the health of the mother and the foetus. The clinic attends to an estimate of 30-40 expectant mothers per day.

3.2 Study Design

A cross-sectional study design was employed. The status of an individual with respect to the presence or absence of exposure and pica practice was assessed at the same point in time. The data consisted both descriptive and analytical components.

3.3 Study Population

The study population included pregnant women between second and third trimester attending antenatal care clinic at PCEA Kikuyu Hospital.

3.4 Sampling

3.4.1 Determination of sample size

Sample size was determined according to Fischer et al. (1992)

\[ N = \frac{Z^2pq}{d^2} \]

Where;

\( N \) = Desired sample size.

\( Z \) = The standard normal deviation set as 1.96 which corresponds to 95% confidence interval.

\( p \) = The proportion in the target population expected to have a particular characteristic (the pregnant women with pica_74.0% (Ngozi, 2008)

\( q = 1 - p \) (proportion of women who do not have pica) i.e. 0.26

\( d \) = Degree of accuracy desired set as 10% i.e. 0.1
3.4.2 Sampling Procedure
Main factor considered in the selection of PCEA Kikuyu hospital was time and logistics necessary to carry out the study. All the women attending the antenatal clinic and were in their second and third trimester were recruited in study until the desired sample size of 74 was achieved.

Criteria for inclusion
Pregnant women attending antenatal care clinic between second and third trimester were included in the study, based on availability and willingness to participate.

Exclusion Criteria
Pregnant women attending antenatal care clinic in their first trimester were excluded from the study.

3.5. Data collection tools and equipment used
The main study tool used in the study was a semi-structured questionnaire while equipment included a non-stretchable adult MUAC tape.

3.6 Data Collection
3.6.1 Pilot Study
The pilot study was conducted at PCEA Kikuyu Hospital among ten randomly selected pregnant women from the antenatal care clinic. The purpose of the pilot study was to pre-test the study tools and the data collection procedure. This helped in identifying ambiguous and difficult
questions, estimate time taken to complete the questionnaire and assessing whether each question
gave appropriate responses.

3.6.2 Recruitment and Training of the Research Assistants

Two research assistants, nursing students from Presbyterian University of East Africa in the
antenatal care clinic with good nutrition knowledge were recruited and trained by the principal
investigator. Training covered interpretation of the questionnaire, interviewing mothers during
the pilot study, coding of the questionnaire and measuring mid upper arm circumference.

3.6.3 Data Collection Procedure

Questionnaire

Semi-structured questionnaires were administered to the study participants. Those who wanted
to fill questionnaires on their own were given the chance. However, precaution was taken not to
influence the responses given and where necessary a standardized explanation was given. Using
the questionnaire data were collected on the following:-

Socio-demographic characteristics

Information on socio-demographic characteristics included age of the participants, occupation
status, marital status, education level, reproductive profile and area of residence.

Dietary practices

This section targeted the frequency with which food items or specific food groups were
consumed by the respondents using food frequency questionnaire.
**Pica practices**

This section covered the types of nonfood items consumed, past occurrence of pica practice before pregnancy, frequency for consumption of nonfood items and reasons for consuming the nonfood items.

**Mid-upper arm measurements**

The methodology used was the standard method, described by Gibson (2005). Non-stretchable tape, calibrated to the nearest 0.1cm, was used for measuring mid-upper arm circumference.

**Haemoglobin levels**

Clinical records were used to obtain the haemoglobin levels of the participants as obtaining blood sample from women would be more invasive, time consuming and costly.

**3.7 Data Quality Control**

The completed questionnaires were cross-checked for completeness of data and filling of the questions. Research assistants were trained adequately. This was done to ensure accuracy in reporting.

**3.8 Data entry and processing**

Data from completed questionnaires were coded then entered, cleaned and analyzed using statistical package for social sciences (SPSS) program. Food types were aggregated into major food groups. Age was categorized into two categories, 15-24 years, 25-34 years and greater than 34 years. Mid-upper arm circumference was also categorized into two based on WHO standards 2006. These categories were; less than 23 cm (at risk of malnutrition), equals to or greater than 23 cm (normal category). This applied to haemoglobin levels less than 11.0g/dl and equals to or greater than 11g/dl.
3.9 Data Analysis

Data analysis consisted of descriptive and analytical components.

i) Descriptive component included prevalence of pica practices, types of pica practices, socio-demographic components, reasons for ingestion of non-food items.

ii) Analytical component included association of pica practice to dietary intake, hemoglobin level, and Mid-upper arm measurement. Differences in dietary pattern Hemoglobin levels, MUAC measurement between women with pica practice and the ones without.

iii) Statistical test used was chi-square for association of variables.
CHAPTER FOUR

4.0 RESULTS

4.1 SOCIO-DEMOGRAPHIC CHARACTERISTICS OF THE STUDY WOMEN

Age distribution of the study women

Mean age of the women interviewed was 26.5 (± 4.8) years, while the minimum and the maximum age were 18 and 38 years respectively. 19(25.7%) of the participants were in the age category of 15-24 years, 48(64.9%) were in the age category of 25-34 years, while 7(9.55) were above 34 years.

Reproductive profile of the study women

Table 1 shows distribution of women by gestational age. 31(41.9%) were in their second trimester (4-6 month), while 43(58.1%) were in their third trimester (7-9 month).

Table 1: Distribution of women by gestational age (N=74)

<table>
<thead>
<tr>
<th>Gestational age</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-6 months</td>
<td>31</td>
<td>41.9</td>
</tr>
<tr>
<td>7-9 months</td>
<td>43</td>
<td>58.1</td>
</tr>
</tbody>
</table>

Table 2 shows that over a half of the pregnant women interviewed 44(59.5%) had children, while 30(40.5%) of the women had no children. 18(24.3%) had one child, 10 (13.5%) had two children, while 11(14.9%) and 4(6.8%) had three and four children respectively.
Table 2: Distribution of women by the number of children (N=74)

<table>
<thead>
<tr>
<th>Number of children</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>30</td>
<td>40.5</td>
</tr>
<tr>
<td>One</td>
<td>18</td>
<td>24.3</td>
</tr>
<tr>
<td>Two</td>
<td>10</td>
<td>13.5</td>
</tr>
<tr>
<td>Three</td>
<td>11</td>
<td>14.9</td>
</tr>
<tr>
<td>Four</td>
<td>5</td>
<td>6.8</td>
</tr>
</tbody>
</table>

Table 3 shows the distribution of study women by age group and the number of children. Most women (68.4%) between 15-24 years had no children. Almost half (45.8%) in the age category 25-34 years had between 1-2 children, while 74.0% of the women above 34 years had between 3-4 children.

Table 3: Distribution of the study women by age group and the number of children

<table>
<thead>
<tr>
<th>Age group</th>
<th>0</th>
<th>1-2</th>
<th>3-4</th>
</tr>
</thead>
<tbody>
<tr>
<td>15-24 years</td>
<td>68.4</td>
<td>21.1</td>
<td>10.5</td>
</tr>
<tr>
<td>(n=19)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25-34 years</td>
<td>33.3</td>
<td>45.8</td>
<td>20.8</td>
</tr>
<tr>
<td>(n=47)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;34 years</td>
<td>.0</td>
<td>28.6</td>
<td>71.4</td>
</tr>
<tr>
<td>(n=7)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Occupation

Table 4 shows the occupation of the women interviewed. 29.7% were housewives, 27.0% were employed, and 25.7% were business women, while casual laborers and students were 10.8% and 6.8% respectively.

Table 4: Occupation of the study women (N=74)

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>House wife</td>
<td>22</td>
<td>29.7</td>
</tr>
<tr>
<td>Regular employment</td>
<td>20</td>
<td>27.0</td>
</tr>
<tr>
<td>Business</td>
<td>19</td>
<td>25.7</td>
</tr>
<tr>
<td>Casual laborer</td>
<td>8</td>
<td>10.8</td>
</tr>
<tr>
<td>Student</td>
<td>5</td>
<td>6.8</td>
</tr>
</tbody>
</table>

Marital Status

Of the women interviewed, 37 (50%) were married, 18 (24.3%) were single, 13 (17.6%) were divorced or separated, while 6 (8.1%) were widowed.

Level of education

Figure 1 shows the level of education. Majority of the women 66 (89.2%) had formal education while 8 (10.8%) had no formal education. However, 17(23.0%) completed primary education, 19 (25.7%) completed secondary education and 10 (13.5%) attended college or university.
Religion

Majority of the women 66(89.2%) were Christians while 8 (10.8%) were Muslims.

4.2 PREVALENCE AND TYPE OF PICA PRACTICE AMONG THE STUDY WOMEN

Among 74 women who participated in the study, over a half of the women 42 (56.8%) were found to practice pica, while 32 (43.2%) were found not to have pica practice. However, pica practice was reported in all the areas of residence. 11.9% of the women who practiced pica were from Dagoretti Corner while 2.4% were from Kawangware. This indicates that pica practice occurs among pregnant women irrespective of their area of residence or where they come from.

Table 5 shows the most commonly ingested non-food substances by the women with pica. The most ingested substances were soft stones followed by soil, charcoal, frozen ice cubes, paint chips and toothpaste in that order.
Table 5: Commonly ingested non-food substances among the study women (n=42)

<table>
<thead>
<tr>
<th>Non-food item</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toothpaste</td>
<td>3</td>
<td>7.1</td>
</tr>
<tr>
<td>Paint chips</td>
<td>4</td>
<td>9.5</td>
</tr>
<tr>
<td>Frozen ice cubes</td>
<td>6</td>
<td>14.3</td>
</tr>
<tr>
<td>Charcoal</td>
<td>7</td>
<td>16.7</td>
</tr>
<tr>
<td>Soil</td>
<td>10</td>
<td>23.8</td>
</tr>
<tr>
<td>Soft stones</td>
<td>12</td>
<td>28.6</td>
</tr>
</tbody>
</table>

35.7% of the women with pica practice reported consuming non-food items 2-3 times a day, 33.3% consumed the non-food items more than three times a day, while 31.0% once a day.

Table 6: Gestational age by frequency of pica practice.

<table>
<thead>
<tr>
<th>Gestational age</th>
<th>once/day</th>
<th>2-3 times/day</th>
<th>&gt;3 times/day</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-6 months</td>
<td>37.5</td>
<td>37.5</td>
<td>25.0</td>
</tr>
<tr>
<td>(n=16)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7-9 months</td>
<td>26.9</td>
<td>34.6</td>
<td>38.5</td>
</tr>
<tr>
<td>(n=26)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

History of pica practice

Table 7 shows that 9(21.4%) of the women with pica reported not to have practiced pica before, while 17(40.5%) reported pica practice during childhood, 7(16.7%) before pregnancy and 9(21.4%) had practiced pica during previous pregnancies.
Table 7: History of pica practice (n=42)

<table>
<thead>
<tr>
<th>Time of occurrence</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Childhood</td>
<td>17</td>
<td>40.5</td>
</tr>
<tr>
<td>Before pregnancy</td>
<td>7</td>
<td>16.7</td>
</tr>
<tr>
<td>Previous pregnancy</td>
<td>9</td>
<td>21.4</td>
</tr>
<tr>
<td>First time</td>
<td>9</td>
<td>21.4</td>
</tr>
</tbody>
</table>

4.3 DIETARY PATTERN OF THE STUDY WOMEN

Figure 3 shows vegetable intake of the study women.
Figure 2: Vegetable intake of the study women

Figure 3 shows animal protein intake of the study women.

![Animal protein intake graph](image)

**Figure 3: Animal protein intake of the study women**

### 4.4 NUTRITIONAL STATUS OF THE STUDY WOMEN

#### Hemoglobin levels

Mean Hb levels for the pregnant women who participated in the study was 11.6 (±0.9) g/dl. Minimum Hb level was 9.4g/dl while maximum Hb level was 12.9g/dl. Most of the women (70.3%) had Hb level ≥11.0g/dl, categorized as normal Hb level during pregnancy (based on WHO standards 2006), and 29.7% had Hb levels <11.0g/dl categorized as low Hb levels as shown in table 8.

**Table 8: Hemoglobin levels for the pregnant women with pica practice (N=72)**

<table>
<thead>
<tr>
<th>Hemoglobin levels</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 11.0g/dl</td>
<td>22</td>
<td>29.7</td>
</tr>
<tr>
<td>≥ 11.0g/dl</td>
<td>52</td>
<td>70.3</td>
</tr>
</tbody>
</table>
Table 9 shows distribution of study women by hemoglobin levels and gestational age. 36.4% in the second trimester had <11.0g/dl Hb levels, while 63.6% in the third trimester had < 11.0g/dl Hb levels. 44.2% and 55.8% in the second and third trimesters respectively had ≥ 11.0g/dl Hb levels.

Table 9: Distribution of study women by Hb levels and gestational age

<table>
<thead>
<tr>
<th>Hb level</th>
<th>Gestational age</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4-6 months</td>
</tr>
<tr>
<td>&lt; 11.0 g/dl</td>
<td>36.4</td>
</tr>
<tr>
<td>(n=22)</td>
<td></td>
</tr>
<tr>
<td>≥ 11.0 g/dl</td>
<td>44.2</td>
</tr>
<tr>
<td>(n=52)</td>
<td></td>
</tr>
</tbody>
</table>

**MUAC status**

Mean MUAC measurement was 24.8± (2.3) cm. Minimum MUAC measurement was 19.9cm while maximum was 29.1cm. However, 14 (18.9%) of the study women had MUAC measurement <23.0 cm (at risk of malnutrition), while 81.1% (60) had MUAC measurement ≥23.0cm (normal nutritional status).

**4.5 ASSOCIATION OF VARIOUS VARIABLES TO PICA PRACTICE**

**Pica practice and level of education**

There was no significant difference between pica practice and education level of the study women since P> .05 (Chi-square test; Likelihood Ratio, P=.236).
Pica practice and gestational period

Table 10 shows the association of pica practice with gestational period of the study women. Chi-square test (P>.05) indicates that there was no significant difference between pica practice and gestational period. However, women in the third trimester were 1.2 times likely to consume non-food items as compared to women in the second trimester.

**Table 10: Association of pica practice with gestational period**

<table>
<thead>
<tr>
<th>Pica practice</th>
<th>Gestational Period</th>
<th>4-6 months</th>
<th>7-9 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes (n=42)</td>
<td></td>
<td>38.1</td>
<td>61.9</td>
</tr>
<tr>
<td>No (n=32)</td>
<td></td>
<td>46.9</td>
<td>53.1</td>
</tr>
</tbody>
</table>

$X^2 = .448$, Relative estimate (second trimester = .8; third trimester = 1.2)

Pica practice and history of occurrence

Table 11 shows correlation of pica practice and history of pica occurrence among the study women. Majority (85.7%) of women who reported history of pica before pregnancy practiced pica. Odds of pica occurring was 5.2 times as compared to women who reported childhood and previous pregnancy history. However, there was no significant difference between pica practice and history of pica occurrence (P>.05)

**Table 11: Pica practice and history of occurrence**

<table>
<thead>
<tr>
<th>History of pica practice</th>
<th>% of pica practice</th>
<th>$X^2$ test (P-value)</th>
<th>Odds Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Childhood (n=17)</td>
<td>Yes 58.8</td>
<td>No 41.2</td>
<td>0.845</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Before pregnancy(n=7)</td>
<td>Yes 85.7</td>
<td>No 14.3</td>
<td>0.084</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Previous pregnancy(n=9)</td>
<td>Yes 55.6</td>
<td>No 44.4</td>
<td>0.938</td>
</tr>
</tbody>
</table>

43
Pica practice and dietary intake

There was no significant difference between vegetable intake among pregnant women with pica practice and those without pica practice since P>.05 (Chi-square; likelihood ratio =.206. This was similar to animal protein intake between the two groups where P>.0 (Chi-square; likelihood ratio =.347).

Pica practice and nutritional status

Figure 4 shows comparison of study women by pica practice and hemoglobin levels. 50% of women with Hb levels <11.0g/dl practice pica, while 59.6% of women with Hb levels ≥11.0g/dl also practice pica. However, there is no significant difference between Hb levels and pica practice since P>.05 (Chi-square; Likelihood Ratio; P=.446).

Figure 5 shows comparison of study women by pica practice and MUAC status. 64.3% of women with MUAC measurement <23.0cm practiced pica, whereas 55% of women with MUAC measurement >23.0cm practiced pica. There was no significant difference between MUAC measurements of the two groups since P>.05 (Chi-square P value=.528). However, women with MUAC measurement <23.0cm were 1.4 times likely to practice pica as compared to women with MUAC measurement >23.0cm who had 0.9 times likelihood of practicing pica (Risk estimate; second trimester = 0.9; third trimester = 1.4).
Figure 4: Comparison of Hb levels of the study women

Figure 5: Comparison of MUAC status of the study women
### 4.6 REASONS FOR CONSUMPTION OF NON-FOOD ITEMS

Table 12: Reasons for consumption of non-food items (n=42)

<table>
<thead>
<tr>
<th>Reason</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unknown cravings</td>
<td>38</td>
<td>90.5</td>
</tr>
<tr>
<td>Pleasant taste, smell and texture</td>
<td>26</td>
<td>61.9</td>
</tr>
<tr>
<td>Copy other pregnant women</td>
<td>18</td>
<td>42.9</td>
</tr>
<tr>
<td>Normal habit during pregnancy</td>
<td>14</td>
<td>33.3</td>
</tr>
<tr>
<td>Loneliness and lack of attention</td>
<td>13</td>
<td>31.0</td>
</tr>
<tr>
<td>Idleness</td>
<td>11</td>
<td>26.2</td>
</tr>
<tr>
<td>Thirst</td>
<td>2</td>
<td>4.8</td>
</tr>
</tbody>
</table>
CHAPTER 5

DISCUSSION

This result was not surprising since most literature reviews indicate that pica is a common practice experienced among pregnant women, majority from African society.

The high prevalence of pica practice in this population of 56.8%, supports prevalence rates of pica practice found in earlier research (Smulian et al., 1995; Geissler et al., 1999). This prevalence rate also concurs with the findings by Edward, et al. (1995), who observed that pica prevalence among pregnant women ranged from as 8% to as high as 68% depending on various groups studied. However, study conducted at Pumwani Maternity Hospital found pica prevalence rate at 74%. These comparisons indicate that prevalence of pica practice might be common in different parts of Kenya where studies have not been conducted.

The findings on the soft stones and soil consumption are not consistent with other studies as they indicate almost half the prevalence at Pumwani (soil, 89.8%; stones 61.2%), Kilifi (56%) and Bondo (45.7%). However, consumption of charcoal (16.7%) is similar to a study conducted at Mysore, India (18%). This indicates that pica practice cuts across the entire world regardless of where one is from. The result of ice prevalence (14.3%) confirms the results of studies conducted in western societies. The findings are similar to those in Atlanta (18.3%) and Washington (8.1%). Low prevalence of ice consumption may be associated with economic status of an individual on an assumption that many women cannot afford refrigerator. The study findings on sources of items being consumed, further indicates that most women consume non-food items within their reach and the ones that they can easily afford. This finding supports the suggestions made by other researchers that pica practice is common among people from low socioeconomic backgrounds (Edwards et al., 1999).
The trends of the results show that women who consumed non-food items tend to increase the frequency of consumption during the third trimester. Although the quantity of the substances ingested at a time per day was not determined, the results calls for concern since higher rate of ingestion on a regular basis could lead to serious health problems and complications.

The absence of association between dietary intake and pica practice is inconsistent with earlier findings by Knox (1995), who observed that individuals with pica consumed less meat and meat products and fewer vitamin C sources (Vegetables).

Even though the results of this study show no association of pica practice to nutritional status, one cannot substantiate the relationship since MUAC measurement does not indicate the specific micronutrient deficiencies of an individual which might be associated with the pica practice. Further still, the association of pica practice to lower hemoglobin levels is not significant. This contrasts many findings which proposed that pica practice is a symptom of iron deficiency or low hemoglobin levels among pregnant women (Moore and Sears, 1994; Smulian, 1995 and Giessler et al., 1999).

Results of this study show that it is likely that women with history of pica develop habitual tendency to pica practice due to past experience. This finding is in line with Sayetta’s (1986) pica literature review.

Among the reasons given for consumption of non-food items, it is not unexpected that craving is the most reason given for the practice. This is consistent with other studies carried out in both developed and developing countries (Reid, 1992, Wiley and Solomon, 1998). Studies done in Kilifi, Pumwani and Bondo, show similarities for ingestion of various non-food items. Women who ingested soil and soft stones attributed ingestion to texture, taste, and influence from other
pregnant, reasons shared by women in a study conducted by Giessler et al. (1999). However, reasons for drawing attention from their spouses and thirst due to foetus’ demand to have water, was a rare scenario.
CHAPTER 6

6.0 CONCLUSION AND RECOMMENDATIONS

6.1 CONCLUSION
The prevalence of pica practice among pregnant women attending antenatal clinic at PCEA Kikuyu hospital during the period of the study was high. However, prevalence for different types of pica practice varied.

There was no difference in prevalence of pica practice between various levels of education. However, women with history of pica practice reported tendency to repeat the practice. Different types of pica practice partly indicated socio-economic status of an individual.

Nutritional status and dietary patterns of women with pica practice and those without pica practice were not significantly different. Therefore, nutritional status and dietary pattern did not influence pica practice among pregnant women in this study.

Majority of pregnant women consume non-food items due to unknown cravings.

6.2 RECOMMENDATIONS
The high prevalence of pica practice among this population supports the prevalence rates in previous research. This reinforces the high prevalence of this disorder, and suggests that questions about the presence of pica practice should be raised routinely in antenatal care clinics.

Understanding that pica practice is an important part of comprehensive care, and noting it in medical records gives other health care providers an opportunity to assess and intervene.

Nurses and Nutritionists caring for pregnant women should use the results of this study to increase awareness on prevalence of pica practices.
In depth longitudinal study covering economic and nutritional conditions before pregnancy, dietary intake throughout pregnancy, the actual quantities of non–food items consumed and analysis of contents of the items among others is recommended in order to substantiate the findings of this study.
REFERENCES


APPENDICES

Appendix 1: Questionnaire

TOPIC

PREVALENCE OF PICA PRACTICES AND ASSOCIATED FACTORS AMONG PREGNANT WOMEN ATTENDING ANTENATAL CARE CLINIC AT PCEA KIKUYU HOSPITAL

SECTION A: SOCIODEMOGRAPHIC INFORMATION

1. Date_________ Age…………….Years

2. Client’s other characteristics.

<table>
<thead>
<tr>
<th>Residence</th>
<th>Occupation</th>
<th>Marital Status</th>
<th>Religion</th>
<th>Education</th>
</tr>
</thead>
<tbody>
<tr>
<td>1=house wife</td>
<td>1=single</td>
<td></td>
<td>1=Christian</td>
<td>1=no formal education</td>
</tr>
<tr>
<td>2=employment</td>
<td>2=married</td>
<td></td>
<td>2=Muslim</td>
<td>2=attempted primary education</td>
</tr>
<tr>
<td>3=business</td>
<td>3=divorced/separated</td>
<td></td>
<td>Others (specify)…</td>
<td>3=completed primary education</td>
</tr>
<tr>
<td>4=casual laborer</td>
<td>4=widowed</td>
<td></td>
<td></td>
<td>4=attempted secondary</td>
</tr>
<tr>
<td>5=student</td>
<td></td>
<td></td>
<td></td>
<td>5=completed secondary education</td>
</tr>
</tbody>
</table>

3. How many children do you have? _______________________

4. Which month of pregnancy are you in? ________________
SECTION B: DIETARY PRACTICES

1. For each food item, indicate with a check mark the category that best describes the frequency with which you usually eat the particular food item.

<table>
<thead>
<tr>
<th>Food item</th>
<th>Daily</th>
<th>2-3times/wk</th>
<th>Once/wk</th>
<th>Monthly</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>Starchy foods</td>
<td></td>
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<tr>
<td>Bread</td>
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<tr>
<td>Ugali</td>
<td></td>
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<tr>
<td>Rice</td>
<td></td>
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<tr>
<td>Porridge</td>
<td></td>
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<tr>
<td>Potatoes</td>
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<tr>
<td>Sweet potatoes</td>
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<tr>
<td>Chapatti</td>
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<tr>
<td>Githeri</td>
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<tr>
<td>Mokimo</td>
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<tr>
<td>Mothokoi</td>
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<td></td>
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</tr>
<tr>
<td>Green bananas</td>
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</tr>
<tr>
<td>Yams</td>
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<td>Vegetables</td>
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<tr>
<td>Pumpkin</td>
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<tr>
<td>Sukuma wiki</td>
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<td>Spinach</td>
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<tr>
<td>Cabbage</td>
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<tr>
<td>Mrenda</td>
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<tr>
<td>Terere</td>
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<td>Managu</td>
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<tr>
<td>Kunde</td>
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<tr>
<td>Green peas</td>
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<tr>
<td>Carrots</td>
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<tr>
<td>Osuga</td>
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</tr>
<tr>
<td>Fruits</td>
<td>Dairy Products</td>
<td>Animal Proteins</td>
<td>Plant Proteins</td>
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<td>-----------------</td>
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<tr>
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<td>Beans</td>
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<td>Pork</td>
<td>Peas</td>
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<td>Mala</td>
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<td>Kidney</td>
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<td>Heart</td>
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<td>Solid cooking fat</td>
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<tr>
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<td>Cakes</td>
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<tr>
<td>Tea</td>
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<tr>
<td>Beer</td>
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<tr>
<td>Spirits</td>
<td></td>
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<tr>
<td>Traditional Brews</td>
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<tr>
<td>Condiments</td>
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<tr>
<td>Soy sauce</td>
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</tbody>
</table>

**SECTION C: PICA PRACTICES**

1. Do you consume non-food substance(s)   O Yes   O No

2. If yes, name the substance(s)

   __________________________________________________________

3. How many times do you consume the non-food substance?

   (i) once/day  (ii) 2-3 times/day  (iii) >3 times/day
4. Where do you obtain the non-food items?

   (i) Purchase from kiosk, roadside, market

   (ii) Immediate environment (open field/ground)

   (iii) Painted walls/painted items

   (iv) Refrigerator

5. Have you experienced pica practice before?

   (i) childhood       (ii) before pregnancy   (iii) previous pregnancy   (iv) never

**REASONS FOR CONSUMING THE NON-FOOD ITEMS**

1. Pleasant taste, smell and texture
   (i) Yes           (ii) No

2. Copy other pregnant women
   (i) Yes           (ii) No

3. Loneliness and lack of attention
   (i) Yes           (ii) No

4. Idleness therefore making yourself busy
   (i) Yes           (ii) No

5. Cravings
   (i) Yes           (ii) No

6. Normal practice during pregnancy
   (i) Yes           (ii) No

7. Clarify reasons selected above

8. Any other reason for consumption of non-food items

**SECTION D: MUAC MEASUREMENTS**

<table>
<thead>
<tr>
<th>MUAC</th>
<th>1ST READING</th>
<th>2ND READING</th>
<th>AVERAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

HAEMOGLOBIN LEVEL

60