

**SCHOOL OF PUBLIC HEALTH  
COLLEGE OF HEALTH SCIENCES  
UNIVERSITY OF GHANA**

**DETERMINANTS OF THE USE OF IODIZED SALT AMONG PREGNANT  
WOMEN ATTENDING ANTE-NATAL CLINIC AT  
THE KANESHIE POLYCLINIC**

**BY**

**MARIAN TWENEBOA**

**(10507617)**

**THIS DISSERTATION IS SUBMITTED TO THE UNIVERSITY OF GHANA,  
LEGON IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE  
AWARD OF MASTER OF PUBLIC HEALTH DEGREE**


**JULY, 2015**

**DECLARATION**

I, Marian Tweneboa, hereby declare that this is an original work, done under supervision and submitted to the University of Ghana, Legon, in Partial fulfilment of the requirement for the award of Master of Public Health Degree. This work has not been presented in whole or part to any other University for award of any degree. All references used has been duly acknowledged.

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.....	.....
MARIAN TWENEBOA	DATE
(STUDENT)	
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DR. MARGRET ATTUAHENE	DATE
(SUPERVISOR)	



## **DEDICATION**

This work is dedicated to all who assisted in making this work a success.

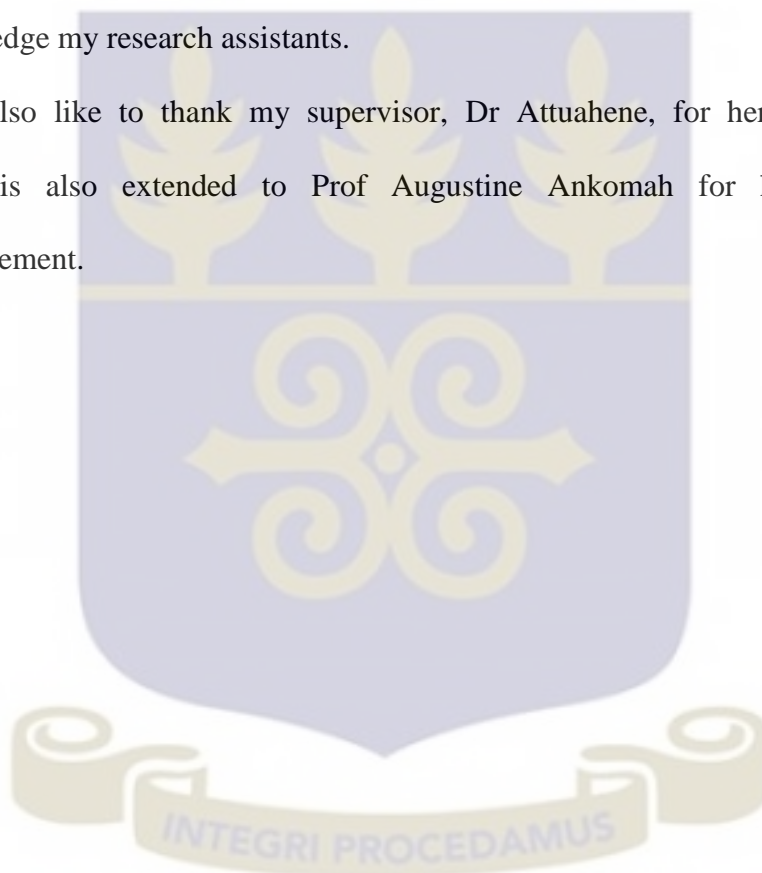


## **ACKNOWLEDGEMENT**

Would like to thank the staff of the Kaneshie Polyclinic, particularly, the administrator, Dr. Patrick Amo-Mensah, also, the clinic matron, the clinic in-service co-ordinator, the ante-natal clinic matron in-charge, for their co-operation and assistance.

Another thanks goes to all the respondents, (pregnant women attending antenatal clinic at the Kaneshie Polyclinic), for their cooperation. Would also like to acknowledge my research assistants.

Would also like to thank my supervisor, Dr Attuahene, for her encouragement. Thanks is also extended to Prof Augustine Ankomah for his support and encouragement.



## **ABSTRACT**

### **Introduction**

Iodine is an important micronutrient which is poorly consumed globally. There are three (3) main micronutrient deficiencies which are of Public Health significance; thus, Iron Deficiency Anaemia, (IDA), Vitamin A deficiency and Iodine Deficiency Disorders, (IDDs).

Iodine deficiency particularly in pregnancy is a global problem of Public Health importance. Severe deficiencies of iodine, particularly in pregnancy increases risk of cretinism, stillbirth, miscarriage, low birthweight, and impaired cognitive development of the unborn baby. The general objective of this study was to find out factors associated with the use of iodized salt, among pregnant women, attending Ante-Natal Clinic at the Kaneshie Polyclinic in the Greater Accra Region of Ghana, from May-June 2015. The specific objectives were to determine the prevalence of the use of iodized salt among pregnant women, and also to find out factors influencing the use of iodized salt among pregnant women.

### **Methods**

The respondents consisted pregnant women attending antenatal clinic at the Kaneshie Polyclinic. A sample size of 400 was used for the study, using the random sampling technique, whereby each member had an equal chance of being selected. The instrument used was a structured questionnaire with closed ended questions. Stata (version 13), was used for the data analysis.

Logistic Regression was used to determine factors significantly associated with iodized salt use / consumption and presented as Odds Ratios (OR) and 95% Confidence Intervals

## **Results**

The findings of the study revealed that, there are some factors influencing the use of iodized salt. Generally, majority (71.0%) of the respondents indicated exclusively using iodized salt, even though their knowledge on it's benefits, as well as problems associated with non-use was quite low as compared to the fact that individuals were aware of the availability of iodized salt. Factors such as Educational level, Cost, Availability, were found not to be associated with the use of iodized salt, as compared to the factors of Knowledge ( health benefits of using iodized salt, and health problems associated with not consuming iodized salt), Taste, as well as Employment Status (socio-economic) which had association with iodized salt use.

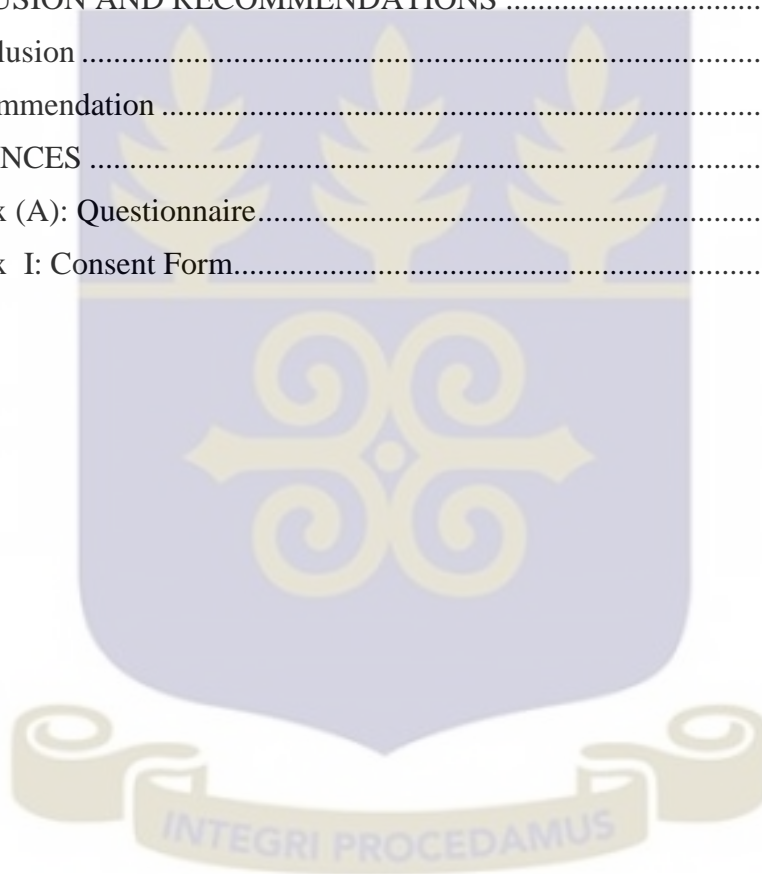
## **Conclusion / Recommendations**

The study found iodized salt consumption to be relatively high, (71%), among the respondents (pregnant women), even though rate has not met global WHO standard, which requires 90% household usage of iodized salt. Public health education on iodized salt use among the general population and particularly this crucial target group of pregnant women, needs to be intensified by health professionals, health institutions and organizations, as well as stakeholders, thereby helping achieving Millenium Development Goals four (4) and five (5). Iodine status assessment should be included in routine antenatal care.

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## DEFINITION OF ABBREVIATIONS

DHMT	District Health Management Team
EDHS	Ethiopian Demographic and Health Survey
GHS	Ghana Health Service
ICCIDD	International Council for Control of IDD's
IDD	Iodine Deficiency Disorders
IFIC	International Food Information Council.
IQ	Intelligence Quotient
JSS	Junior Secondary School
Mg	milligram
MI	Micronutrient Initiative
mμ/l	Milli macro per litre.
NHIS	National Health Insurance Scheme
Ppm	parts per million
SPSS	Statistical Package for Social Sciences
UNICEF	United Nations International Children Emergency Fund
USA	United States of America
USI	Universal Salt Iodization
WAEMU	The West African Economic and Monetary Union
WHO	World Health Organization
UIC	Urinary Iodine Concentration



## CHAPTER ONE

### 1.0 INTRODUCTION

Iodine deficiency is a major global public health challenge (Anderson *et al.*, 2012). The most damaging result of IDD are in the first thousand (1000) days of life, thus from conception up to the age of two (2years) (Zoeller & Rovet, 2004). Severe iodine deficiency during this critical period, increases the risk of complications such as, stillbirth, congenital abnormalities, perinatal and infant mortality, and interferes with physical, motor function and cognitive development (Zimmermann, 2009).

It is estimated that a great section of the worldwide population have insufficient iodine intake, with those in South Asia and Sub-Saharan Africa, particularly affected. In most countries, the best strategy to effectively control iodine deficiency is iodization of salt. However, efforts to fight iodine deficiency disorders and reach the third (3<sup>rd</sup>) of the global population that is still deficient, poses major challenges (Zimmermann, Jooste & Pandav, 2008).

#### 1.1 Background

Research indicates that, iodine deficiency during pregnancy, is related to problems in brain, mental or cognitive development (Johnson, 2013). Emerging research is beginning to create awareness among scientists, that suggests that, society need to address mild to moderate iodine deficiency, especially in pregnant and breastfeeding women (Johnson, 2013).

Universal Salt Iodization (USI), is a programme carried out in a systematic manner, aimed at increasing the production, demand and supply of iodized salt (Pandav *et al.*, 2003). USI is recognized as the most effective sustainable and cost effective approach

to address iodine deficiency at the country level. A country is said to have met USI, when at least 90% of households consumed adequately iodized salt (UNICEF, 2008).

The objectives of the programme are expanded to include five (5) main initiatives:

- Assessing the magnitude of IDD
- Supplying iodized salt to the entire population
- Assessing the impact of USI every 5years.
- Laboratory monitoring of iodized salt and urinary iodine concentration (UIC).
- Ensuring effective health education. (Pandav *et al.*, 2003)

Strategies to ensure effective USI Programme may include:

- Ensuring there is adequate supply of Potassium Iodate.
- Providing technical and financial support for the national micronutrient survey.
- Advocating for a revised salt law, and strict enforcement of existing legislation.
- Working with a selected group of salt producers to improve iodization quality.
- Promoting the use of Rapid Test Kits (RTK) at a local level, to determine whether salt is adequately iodized.
- .Creating and airing TV programmes to educate households on the importance of using iodized salt.

Challenges or barriers to USI, may include, the five (5) main guiding principles, critical to sustained USI programme success;

1. Ensuring good political commitment, (that is various ministries, such as, railways/roads, information, industry, food & agriculture, judiciary,) thus with reference to, quantity, quality and distribution of adequately iodized salt.
2. Building partnership with relevant stakeholders
3. Ensuring availability
4. Having a strong and effective monitoring and evaluation system
5. Continuing advocacy, education and communication (Rah, Anas, Chakrabarty, Sankar, Pandav, & Aguayo, 2013).

The International Council for Control of Iodine Deficiency Disorders (ICCIDD), is a non-profit, non-governmental organization, committed to sustained optimal iodine nutrition, as well as elimination of iodine deficiency worldwide.

Distribution of infants delivered in developing countries annually who are unprotected against IDD, by region, from the years, 2000-2006, are as follows;

- Latin America / Caribbean – 1 million
- Middle East / North Africa – 3 million
- East Asia / Pacific – 5 million
- Eastern Southern Africa – 6 million
- West / Central Africa – 4 million (Pearce, Anderson, & Zimmermann, 2013).

The National Health & Medical Research Council (NHMRC) recommends that, all women who are pregnant, breastfeeding or thinking of becoming pregnant, take an iodine supplement of 150 micrograms each day in addition, women with pre-existing thyroid conditions are required to seek advice from their physician prior to taking a supplement (Morreale, Jesu's, & Escobar, 2007).

Ghana has not yet achieved the global target of 90% consumption of iodized salt, irrespective of she being the leading producer of salt in the West African Sub-region (Ahiadeka, Ackah, Aryeetey, & Acquah, 2012).

It is estimated that, nearly 120,000 children born every year, in Ghana, are predisposed to developing intellectual impairment as a result of iodine deficiency. Approximately 15,600 (13%) of these new-borns are seriously mentally impaired and thereby unable to develop properly, leading to an average of 22million dollars loss in economic productivity each year, and also great adverse effects on the Ghanaian educational system (Buxton & Baguune, 2012). A survey carried out by the Ghana Health Service (GHS), to assess the consumption levels of iodized salt in households in 2002, 2003, 2005, 2006, revealed that, only 49.%, 41.5%, 74.1%, and 50.8%, respectively of various households in the country consumed iodized salt (GHS, 2007).

Iodine is an important component of the hormones produced by the thyroid gland. Thyroid hormones, and therefore iodine, is important for human life. In 2007, WHO estimated that almost two (2) billion individuals have an insufficient iodine intake. Although goiter is the most noticeable manifestation of iodine deficiency, the major impact of hypothyroidism due to iodine deficiency is impaired neurodevelopment, particularly early in life. In the foetal brain, inadequate thyroid hormone interferes with myelination, cell migration, differentiation and maturation. Moderate-to-severe iodine deficiency during pregnancy increases rates of spontaneous abortion, reduces

birth weight, and increases infant mortality. Offspring of mothers lacking iodine are at high risk for cognitive disability, with cretinism being the most severe manifestation. Moderate-to-severe iodine deficiency during childhood reduces growth. Correction of mild-to-moderate iodine deficiency in primary school aged children improves cognitive and motor function. Iodine prophylaxis of deficient populations with periodic monitoring is an extremely cost effective approach to reduce the substantial adverse effects of iodine deficiency throughout the life cycle (WHO, 2011).

Nearly two billion (28%) of the world's population, of whom more than 321 million (39%) are Africans, are at risk of insufficient iodine intake (Anderson *et al.*, 2011).

Research suggests that, iodine deficiency during pregnancy is associated to problems in foetal brain and cognitive development. Emerging research is now creating awareness among scientists, that there is the need to address mild to moderate iodine deficiency, most importantly in pregnant and breast feeding women (Johnson, 2013).

Globally, severe iodine deficiency is a major cause of preventable mental retardation, leading to a condition referred to as Cretinism. Mild to moderate iodine deficiency during pregnancy, can be considered as a factor determining a child's IQ development later in life (Johnson, 2013).

Based on the global data of iodine nutrition, Ethiopia is categorized among moderately iodine deficient countries. Similarly, Ethiopia is one of the African countries with the highest prevalence of IDD and with the weakest program to prevent IDD (Hussein & Assey, 2012). From 34.5% to 37% of the childbearing women in the country have goiter (Abuye & Berhane 2007).

Because of the higher production and fetal transfer of maternal thyroid hormone, fetal iodine transfer, pregnant women need more iodine than other populations. (Zimmermann, 2011). They are required to consume 250 µg of iodine a day.

However, they hardly meet their requirement solely from the usual diets (Zimmermann, 2011).

Universal salt iodization (USI) is the most cost effective strategy recommended to eliminate IDD (Zimmermann, 2012). It is estimated that, more than one-third of African households do not have access to iodized salt. (Anderson et al., 2010). In Ethiopia only 20% of the Ethiopian households use adequately iodized salt. Thus, as a serious public health problem for the Ethiopian population. As a result a national regulatory provision for mandatory universal salt iodization was offered in 2011.

Still, hardly any of the previous studies done on the problem in Ethiopia have considered subclinical iodine deficiency in pregnant women.

Iodine deficiency disorders are major public health problems in several areas of the world, especially in developing countries. It has been reported that 2.2 billion people (38% of the world's population) live in areas with iodine deficiency and are at risk of its complications. At least 350 million Africans are at risk of iodine deficiency. According to WHO estimates, goiter presents in 28.3% of the African population and approximately 25% of the global burden of iodine deficiency as measured by disability-adjusted life years occurs in Africa.

Approximately 70% of households in the world used iodized salt by 2000, compared with less than 20% in 1990. The elimination of iodine deficiency, by efficient production, marketing, and universal consumption of iodized salt, represents a significant development effort in public nutrition. Although globally iodine nutrition has improved, 20% to 30% of pregnancies and thus newborns still do not fully benefit from the use of iodized salt.

Universal salt iodization has been extremely good at reducing the burden of IDD and represents a major global public health success. In Africa, great progress has been

made on the elimination of iodine deficiency, saving millions of children from its negative effects, largely due to the increased household availability of iodized salt.

In Ethiopia, one out of every 1000 is a cretin mentally handicapped, due to a congenital thyroid deficiency, and about 50,000 prenatal deaths are occurring annually due to iodine deficiency disorders. Of the total population, 26% have goiter and 62% are at risk of IDD according to national survey made by the previous Ethiopian Nutrition Institute. According to the Ethiopian Demographic and Health Survey (EDHS), only 15.4 percent of the households were using iodized salt.

### **1.2 Statement of the problem**

Global Prevalence of iodine deficiency and proportion of households with access to iodized salt, showed;

Africa- 66.6%

Europe- 49.2%

America- 86.8%

South east Asia - 61.0%

Total Worldwide – 70.0%. These figures not meeting the WHO, and ICCIDD Standard, which require that, 90% of households need to use iodized salt, for IDDs to be eliminated.

Many of these countries have weak or non-existent control programmes for iodine deficiency disorders (WHO, 2007).

As part of efforts to achieve the Universal Salt Iodization (USI) goal, the government of Ghana, launched the Universal Salt Iodization programme, backed by an act of parliament, to oversee the attainment of this goal (Ohlhorst, Slavin, Bhide, & Bugusu,

2012). Notwithstanding these efforts, iodine consumption amongst households and individuals is generally low.

Iodine deficiency is the single greatest cause of preventable mental impairment, a problem that can be effectively and inexpensively prevented by iodizing all salt for human and animal consumption. There has been political support for the elimination of iodine deficiency disorders (IDD) in Africa, beginning with the 1990 World Health Assembly Resolution 43.2 that established the goal of eliminating IDD as a public health problem and the endorsement of universal salt iodization (USI) as the means to effectively end IDD by West African Heads of State and Governments in 1994. The West African Economic and Monetary Union (WAEMU or UEMOA from its name in French, Union économique et monétaire ouest-africaine) has also recognized the importance of ending IDD and to facilitate intra-region trade of iodized salt. Such commitment, coupled with increased production of iodized salt and advocacy, awareness creation, and agency collaborations provided the basis for improvements in the household coverage of adequately iodized salt.

Each of the eight UEMOA countries has mandatory legislation in place on salt iodization. However, poor monitoring and enforcement of this legislation is considered a major reason why the household consumption of iodized salt remains sub optimal. In an effort to address this problem, key stakeholders including the West African Health Organization, Helen Keller International, the Micronutrient Initiative (MI), the International Council for Control of Iodine Deficiency Disorders (ICCIDD), the United Nations Children's Fund (UNICEF), and the UEMOA Technical Committee for Food Products met in 2005 to develop UEMOA Regional Standards on salt iodization. However, this draft document was not adopted by the UEMOA

Commission and its Member Countries in the five years to come, probably due to lack of political commitment.

Several countries have weak, or absent legislation on iodized salt (Abuye & Berhane, 2007).

Control of iodine deficiency in particularly in Sub-Saharan Africa, has several challenges, these including, iodized salt programmes eliminated by conflict, famine, political instability (Okosiene, 2006).

In Sierra Leone, severe IDD prevalence is occurring which if unchanged, over the next 5 years, can contribute to loss of productivity, as a result of intellectual impairment, from in-utero iodine deficiency.

It is estimated that yearly, potential economic losses as a result of iodine deficiency in developing countries, have been estimated as at approximately, 35.7 million US dollars.

A study conducted on; Factors influencing the use of adequately iodated salt in Ghana, it was revealed that, although there had been some education on the use of iodated salt, most people were still not using it (Ahiadeke, Ackah, Aryeetey, & Acquah, 2012).

Some of the factors influencing the use of adequately iodised salt included the level of education of the household, especially the head. The study showed that household where the head had been educated at least to the Junior Secondary School (JSS) level were more likely to use adequately iodated salt, while those who had no education, were less likely to do so.

The study also showed that the more wealthy a household was, the more likely it was that it would use adequately iodised salt and vice versa. It was also brought to light that the gender of the family head was one of the strongest factors associated with the use of adequately iodised salt. A family where the head was female was found to use more iodised salt than one where the head was male.

It was also detected that the wide use of non-iodised salt by most people was due to its availability and affordability as opposed to the iodised salt which is relatively expensive.

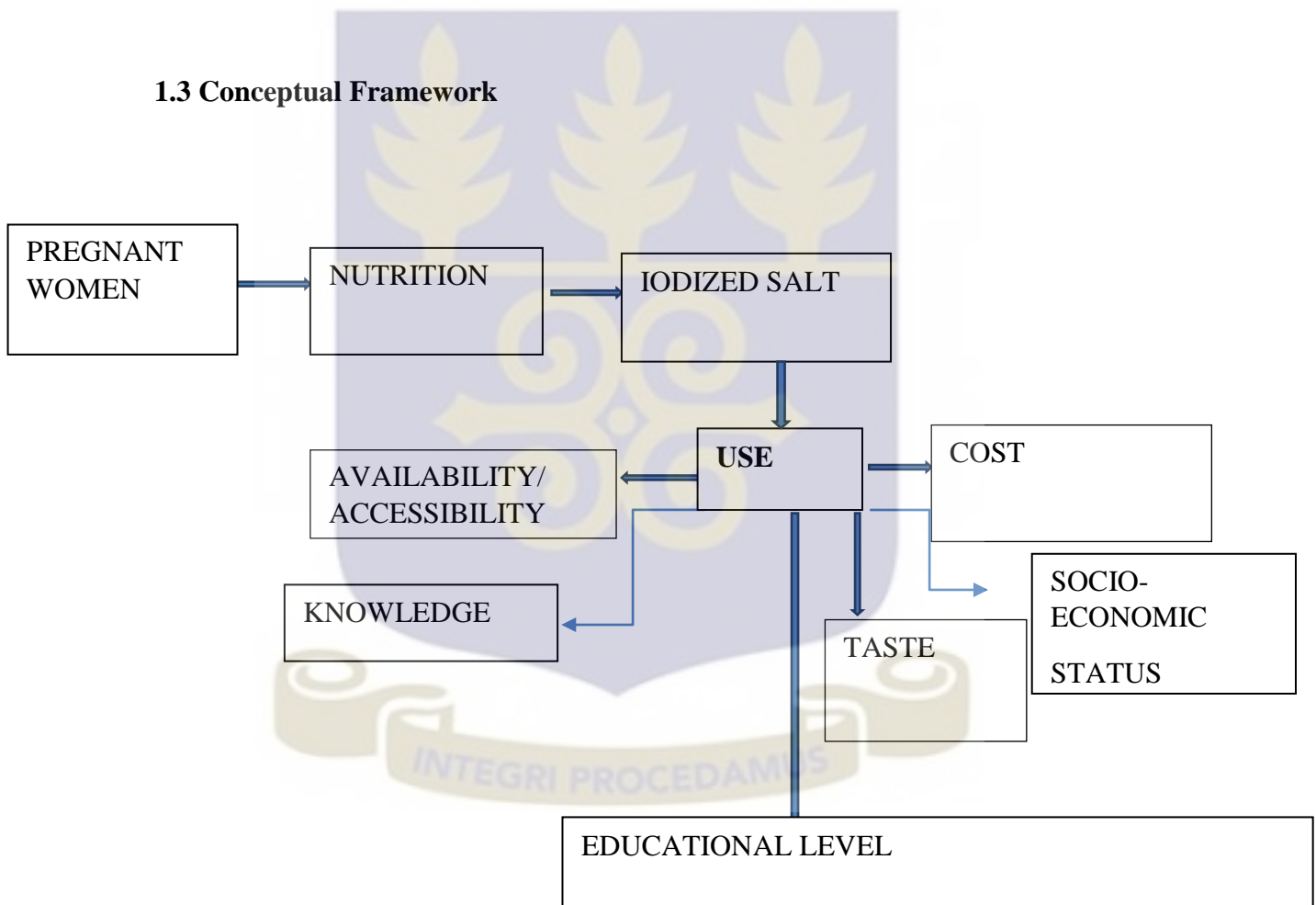
Also lack of enforcement of the law on consumption of iodated salt due to the fact that there are many producers of salt. As a strategy to achieve the USI target, the government of Ghana launched the USI programme in 1995, supported by the food and drugs amendment act, (1996), act 523, established by parliament of Ghana, to ensure the effectiveness and success of the USI (Buxton & Bagueune, 2012).

Iodine deficiency causes ailments such as goiter, stunted growth, malnutrition in children under five years and pregnant women, spontaneous abortion and poor cognitive development of foetus. In 2005, the GHS, set a national household iodized salt usage target of 90%, to be achieved by the end of 2005 and sustained by 2011. However, a study done in 2008, by the Ghana Health Service (GHS), indicated that, only 74% of households used iodized salt, which was still far below the WHO target of 90% (GHS, 2005). According to the Ghana Demographic and Health Survey, conducted in 2008, only 55.0% of households specifically in the Greater Accra Region consumed iodized salt (Ghana Statistical Service, 2008). A Multiple Indicator Cluster Survey, (MICS, 2010-2011), carried out in five (5) highly dense populated areas within Accra, precisely Nima, James Town, Accra New Town, Bubuashie and

La, revealed that, there is a recognizable difference between the rich and poor households with reference to iodized salt consumption. Close to 80% of the rich households used iodized salt as compared to about 53% of the poor households.

It is obvious that consumption of iodized salt is alarmingly low, hence the need to find out determining factors on the use of iodized salt, particularly among pregnant women attending antenatal clinic at the Kaneshie Polyclinic in the Greater Accra Region of Ghana.

### 1.3 Conceptual Framework



**Figure 1: Conceptual Framework**

#### 1.4 Description of Framework

The conceptual framework for this study, illustrates the relationships between the various variables. Thus the nutrition of pregnant women, with specific reference to intake / use of iodized salt, examining factors determining it's usage, which includes;

- Knowledge
- Educational Status
- Taste
- Cost
- Socio- economic / Occupational Status

The study was done within the framework of the Health Belief Model, (HBM), which shows that, the major health beliefs underlying the threat and behavioural strategies, provides a beneficial framework for understanding individual differences in health behaviour, and for adopting interventions to change behaviour, (Abraham, & Sheeran, 2005). This model is commonly applied to health education and health promotion (Glanz, *et. al.*, 2002). It has an underlying assumption that, healthy behaviour is determined by, personal beliefs, or perceptions about a disease condition, and the interventions available to decrease it's occurrence ( Hochbaum, 1958). It is a model that tries to explain individual behaviour, and thereby, explaining determinants and factors that influence an individual's decisions related to health behaviour change and it's maintainance. Basically, the HBM, indicates that, whether or not an individual changes or maintains a specific behaviour, it is influenced by perceptions of the feasibility as well as benefits of the adopted new behaviour, weighted against the perceived costs, or dangers ( Becker, 1974). These perceived feasibility, benefits and costs, related to a health intervention or behaviour change, are based on a range of

personal factors including perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action and self – efficacy.

**Perceived Severity;**

This examines the individual's beliefs about the effects of a particular behaviour or disease condition. Most often, perception of severity is based on health information or knowledge (Mc Cormick - Brown, 1999). For example, an individual may use iodized salt because he knows the health problems associated with not using it. Or in another dimension, an individual who does not consider goitre as a serious health problem associated with non-use of iodized salt, may be less likely to use iodized salt.

**Perceived Susceptibility;**

This shows an individual's beliefs about the likelihood of acquiring a Disease. Thus, the bigger the perceived risk, the higher the probability of engaging in healthy behaviour to minimize the risk. Example, when individuals believe they are at risk for developing IDD's if they do not consume iodized salt, they will be more likely to consume it to prevent IDD's.

**Perceived Benefits;**

This indicates an individual's belief that an action will reduce risks or seriousness of effects. Individuals adopt behaviour change when they believe that the adopted behaviour will decrease their probability of acquiring a disease.

**Perceived Barriers;**

This examines an individual's own perception of hindrances / obstacles, in his way, as he tries to adopt a new behaviour. In order to overcome barriers, the individual need to believe that, the benefits of the health behaviour outweighs the consequences.

These barriers may include, culture, educational level, past experiences, cost, wealth, availability among others.

### **Cues of Action;**

These are happenings or events, people or things that encourage individuals to change their behaviours. These include media reports, campaigns, health education. These propel the individual for behaviour change (Graham, 2002).

### **Self – Efficacy;**

This belief in one's ability to take action to produce desired outcome (Rosenstock, Strecher & Becker, 1988).

## **1.5 Justification of the study**

Governments and Non-governmental bodies, need to take the effects of iodine deficiency very serious; individuals basically equate iodine deficiency with goitre, which is a less urgent priority. Iodine-deficiency disorders are the most important cause of preventable mental retardation and impairment globally, and their elimination can greatly contribute to the attainment of at least five of the Millennium Development Goals: (a) Eradicate Extreme Poverty and Hunger; (b) Achieve Universal Primary Education; (c) Reduce Child Mortality; (d) Improve Maternal Health; and (e) Develop a Worldwide Partnership for Development.

In Ghana, it's estimated that, almost 50% of households use iodized salt.

As at 2008, 74% households consumed the salt in Ghana (GHS, 2008). The medium term health strategy for Ghana concerning vision 2020, which was revised in August 2000, still revealed and emphasized that, levels of IDD among the general population, were relatively high. It is therefore necessary to undertake this study, to provide

current and additional information concerning the use of iodized salt, particularly among pregnant women attending Ante Natal Clinic at the Kaneshie polyclinic. Findings of this study would only not be useful to District Health Management Teams (DHMT), responsible for planning health promotional and educational programmes, on the use of iodized salt in Ghana, but also to a great magnitude, help relevant stakeholders in this discipline, to implement cost effective strategies aimed at achieving the national household iodized salt usage target of 90%, by 2015 (GHS, 2005). The study will give a baseline information on the inability of Ghana to meet set global targets, with reference to iodized salt usage.

Findings of this study would also be useful to other countries struggling with this problem of IDD, particularly among pregnant women and infants, which contributes to maternal, foetal and infant complications, indirectly resulting in maternal and infant mortality.

## **1.6 Objectives**

### **1.6.1 General Objective**

The general objective of the study is to find out determinants on the use of iodized salt among pregnant women attending antenatal clinic at the Kaneshie Polyclinic.

### **1.6.2 Specific Objectives;**

1. To determine the prevalence of the use of iodized salt among pregnant women
2. To ascertain factors that influence the use of iodized salt among pregnant women attending antenatal clinic at the kaneshie polyclinic.

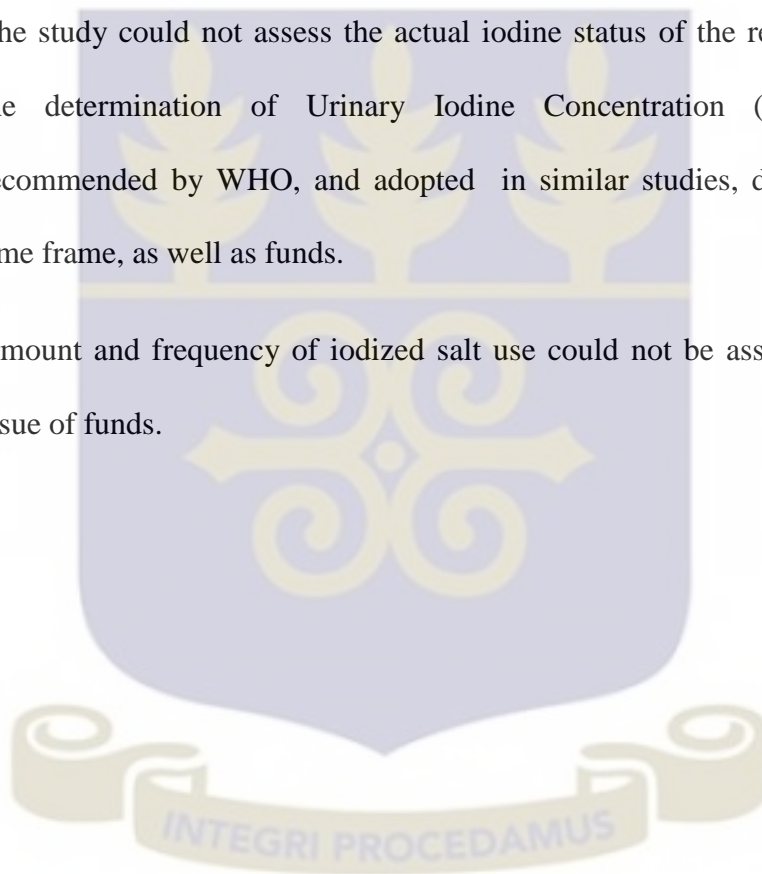
### **1.7 Research Questions**

1. What is the prevalence of the use of iodized salt among pregnant women?
2. What factors influence the use of iodized salt among pregnant women?

### **1.8 Limitations of the study**

These were mainly inadequacy of resources, which included;

- The study could not assess the actual iodine status of the respondents, using the determination of Urinary Iodine Concentration (UIC) levels as recommended by WHO, and adopted in similar studies, due to inadequate time frame, as well as funds.
- Amount and frequency of iodized salt use could not be assessed, due to the issue of funds.



## CHAPTER TWO

### 2.0 LITERATURE REVIEW

Iodization of all salt, referred to as USI, for both animal and human consumption, is a major worldwide measure, for effective control of iodine deficiency, whereby, iodine is added to universally consumed food products such as common salt. It's been recommended by WHO, ICCID, and UNICEF that, about 20mg to 40mg of iodine per 1kg salt is to be added to food items, taking into consideration the local salt intake ( Ohlhorst, Slavin, Bhide & Bugusu, 2012 ). Iodine added to salt as Potassium iodide or iodate, does not impart colour, taste, or odour to the salt ( Manner & Dunn, 1995 ).

About two hundred years ago, salting was the basic method available for preserving foods. As a result, salty flavors were common and well-accepted. By the nineteenth century, other methods of food preservation surfaced, including canning, freezing, and refrigeration. This led to a change in taste preferences and a desire for less salty flavors. By the twentieth century, methods of food preservation, such as pasteurization, freeze-drying, irradiation, and the use of preservatives, allowed food manufacturers to preserve many foods on a larger scale without relying on salt. Today, salt is still used for food preservation, but the majority of the world's salt is used for industrial use, including highway salting, water conditioning, and the manufacture of chlorine and other chemicals.

At various times and places throughout history, salt also played an economic role. The ancient Greeks used salt as currency. Roman soldiers received a salt ration as part of their pay, known as “salarium argentum,” from which the English word for “salary” was derived. Other cultures relied heavily on salt production and trade, and salt even has been the cause of a bitter war. Salt also has played a vital part in religious rituals

in certain cultures. Over many centuries, it has been used symbolically—as a symbol of wisdom when given to a newborn in ancient Rome and, in Europe, a pinch of salt was tossed over the left shoulder three times to drive off evil. Even today, “take it with a grain of salt” is a well-known phrase that conveys the thought to not take something too seriously.

Salt is available in various crystal sizes, granulated, or of different shapes, each with different purposes.

- *Table salt* is a fine-grained salt that often contains an anti-caking ingredient, such as calcium silicate, to keep it free-flowing. It is available iodized or non-iodized. This type of salt is mainly used in cooking and at the table.
- *Kosher salt* contains no additives and has a coarse grain. It is frequently used in the preparation of kosher meats.
- *Sea salt* comes in either fine or coarse grain and has a slightly different taste caused by other minerals it contains. It is produced by evaporation of sea water and is often named after the originating sea—Black Sea, French, or Hawaiian sea salt.
- *Pickling salt* is a fine-grained salt used for brines to make pickles and sauerkraut. It contains no iodine or anti-caking ingredients, which would make the brine cloudy.
- *Specialty salts*, such as popcorn salt, pretzel salt, or margarita salt, are salts of various grain sizes and textures used for special purposes. Often, other types of salt, such as table salt or kosher salt, can be substituted for these specialty salts with similar results.

- *Seasoned salt* is a salt blend that includes herbs and other seasoning ingredients. Because of the added flavor ingredients, this may allow for use of less seasoned salt as compared to other types of salt.
- *Salt substitutes*, also referred to as light salts, typically replace all or some of the sodium with another mineral, such as potassium or magnesium.
- *Rock salt* is a non-food salt of a larger crystal size. Because salt lowers the freezing point of ice, it causes ice to melt. For this reason, rock salt is frequently used as a de-icing agent for sidewalks and driveways. It also is used in combination with ice to make ice cream in certain types of home ice cream freezers. As the ice melts, it absorbs heat from the ice cream, helping it to freeze more quickly. (IFIC, 2014).

Iodine is a trace element found in seawater, certain soil, good food sources include sea fish and shellfish. Iodine can also be found in plant sources such as cereals and grains, but the levels are different depending on the amount of iodine in the soil where the plants are grown. Adults need 0.14mg of iodine a day. Pregnant women require 250µg/L. Most people should be able to get all the iodine they need by eating a balanced diet, which contains various sources of iodine.

According to the 2011 "Guidelines of the American Thyroid Association for the Diagnosis and Management of Thyroid Disease During Pregnancy and Postpartum," a woman's need for iodine is increased when pregnant. Iodine is needed for the high thyroid hormone production during pregnancy, as well as to meet the fetal demand for iodine. Mild to moderate iodine deficiency increases the risk of maternal and fetal goiter, as well as cognitive problems and attention deficit and hyperactivity disorders in children.

Severe iodine deficiency is the leading cause of mental retardation in the world today. Severe iodine deficiency in pregnant women can result in spontaneous abortion, stillbirth, and increased perinatal and infant mortality, as well as developmental problems in children, including cretinism - a condition that can involve severe mental retardation, deaf-mutism, and motor function problems.

According to studies, while the U.S. population typically is iodine sufficient, women in their reproductive or childbearing age are most likely to have low iodine levels. Worldwide, iodine deficiency affects over 2.2 billion people, and is most prevalent in South Asia, East Asia Pacific, and the East and South African regions. In regions with severe iodine deficiency, pre-conception iodine supplementation has led to improved cognitive performance in children, and has reduced the risk of cretinism, other severe complications, including stillbirth, and neonatal and infant mortality.

The key benefits seem to occur if iodine supplementation begins before conception, or occurs during the first 10 weeks of pregnancy. The benefits appear to reduce if supplementation begins after 10 to 20 weeks of gestation (Stagnaro-Green *et al.*, 2011). The Guidelines recommend that all pregnant and lactating women get a minimum of 250 mg iodine daily, and to achieve that, they should supplement diet with a daily oral supplement that contains 150 mg of iodine, in the form of potassium iodide.

Iodized salt is a form of salt which has been fortified with iodine. The practice of adding iodine to salt in the United States began in the 1920s as a way to combat thyroid gland disorders. Salt was chosen as the medium because it's affordable and everyone uses it (Alfaro, 2014).

Iodine is required by the thyroid gland to produce thyroid hormones, which regulate the body's metabolism, growth, and vital organ function (Pravalika, 2013). The thyroid gland is a butterfly-shaped body located in the front of the neck below the Adams apple. It is one of the important endocrine glands. The gland surrounds the windpipe (trachea) and is formed by lobes attached by a middle part called the isthmus.

Two most important hormones produced by the thyroid gland are Thyroxine (T4) and Triiodothyronine (T3). Another hormone called Calcitonin is also produced by the thyroid gland. This hormone also contributes to the regulation of calcium and helps lower calcium levels in the blood. The various diseases involved with the thyroid gland, thus when there is deficient iodine intake, is collectively referred to as Iodine Deficiency Disorders (IDD). Iodine deficiency during pregnancy can cause maternal and foetal hypothyroidism and interfere with neurological development of the foetus. The most severe clinical manifestation of this is cretinism. Controlled studies have shown that, iodine supplementation before, or during, early pregnancy, prevents new cases of cretinism, increases birth weight, lowers rates of perinatal and infant death, and to a large extent, increases developmental scores in young children, by 10-20% (Zimmermann, 2012). Generally, IDDs of which pregnant women are predisposed, should there be a state of iodine deficiency, may include the following ;

### **Hypothyroidism**

Production of thyroid hormone is below normal, often exhibiting very subtle symptoms.

### **Hyperthyroidism**

Hyperthyroidism is a disorder in which there is over production of thyroid hormone

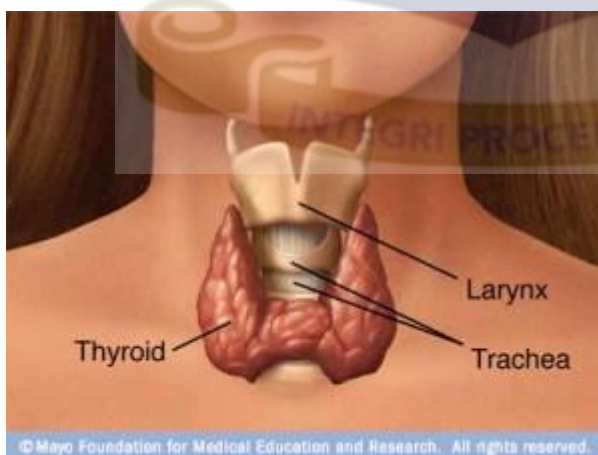
due to an overactive thyroid gland. Clinical manifestations include increased heart rate, depression, weight loss, and slow cognition. Treatment is provided by administration of medication, the use of radioactive iodine, thyroid surgery, or by reducing the dose of thyroid hormone.

### **Hashimoto's thyroiditis**

Similar to hypothyroidism, caused by inflammation of the thyroid gland. Symptoms include fatigue, cold intolerance, weight gain, excessive sleepiness, dry or coarse hair, difficulty swallowing, a lump in the front of the throat etc. Hypothyroid medication is the course of treatment for this disorder.

### **Graves' disease**

A disorder that affects the thyroid. Symptoms include hand tremors, inability to sleep, rapid heartbeat, enlarged thyroid and also thinning of the skin or fine brittle hair. Some factors responsible for Graves' disease include, genes, gender, stress, and infection. Treatment for Graves' disease involves providing suitable medication.



**Figure 2: A diagram of the butterfly-shaped Thyroid gland.**

### **Hyperparathyroidism**

A disorder of the parathyroid glands, occurs in two forms namely primary and secondary. Hyperparathyroidism results when the parathyroid glands produce excess hormone. Symptoms include fatigue, depression, loss of appetite, weakness, nausea, vomiting, constipation, or confusion. This disorder can also result in the formation of kidney stones due to increased calcium and phosphorous excretion. Surgical removal of the glands is the main form of treatment.

### **Thyroid nodules**

Any abnormal growth that forms a lump in the thyroid gland is called a thyroid nodule. Most of the thyroid nodules are not fatal.

### **Thyroid cancer**

The four major types of thyroid cancer are papillary, follicular, medullary, and anaplastic. Symptoms include swollen lymph nodes, pain in the throat, difficulty swallowing, hoarseness, and a lump near the Adam's apple. Treatment measures include chemotherapy, radioactive iodine, surgery, hormone treatment or external radiation. The option of treatment depends upon the type of thyroid cancer, the tumor size, patient's age, whether the cancer has spread to nearby tissues.

### **Hypoparathyroidism**

Hypoparathyroidism, results in scanty production of parathyroid hormone. Causes include injury to the parathyroid glands, or the condition may be also present at birth. Symptoms include tingling fingers, brittle nails, dry, coarse skin, dry hair, memory loss, severe muscle cramps, malformed teeth, and convulsions. Treatment involves restoring calcium and phosphorus to adequate levels in the body.

### **Myxedema Coma**

Myxedema coma is a life-threatening complication involving the loss of brain function resulting from longstanding low levels of thyroid hormone in the blood. It can be caused due to excessive medications, infections stroke, trauma and other factors. . Some symptoms include hypothermia, coma, seizures, difficulty in breathing and more. Treatment however depends on the severity of the disease.

### **Thyroiditis**

Thyroiditis is the inflammation of the thyroid gland. This results in excess release of thyroid hormones into the blood resulting in a temporary hyperthyroid state. Thyroiditis can be diagnosed based on tenderness and enlargement of the thyroid gland. A thyroid scan is carried out to diagnose the problem. Thyroiditis can also be diagnosed thorough a biopsy of the thyroid gland.

Iodine deficiency can affect individuals during all stages of development, however, pregnant women, infants and children are especially at a high risk. Because of changes that occur in maternal thyroid hormone during pregnancy and the potential health problems of iodine deficiency on the offspring, an adequate dietary iodine intake during the period of pregnancy is very important. The World Health Organization, United Nations Children's Fund and International Council for the Control of Iodine Deficiency Disorders have said that dietary intake of iodine during pregnancy should be 200-300 micro g/day to compensate for the high requirements in pregnant women (Boric et al., 2009) .

Salt iodation is a cost effective Public Health intervention. Averagely, the one-time increase in cost is only 3-5 cents per person, per year - , a price so low that even users

in the least developed countries would barely notice (Mannar, 2004). There are two (2) forms of iodine in iodized salt; 'Iodide' and 'Iodate', usually as the Potassium salt. Both are generally referred to as 'Iodized' Salt (Delange & Hetzel, 2004). Almost 70% of the salts for humans and livestock in the world are iodized today (Mannar, 2004). According to UNICEF less than 20% of households in the developing world were using iodized salt in the early 1990s, and by 2000, the average had jumped to 70% (UNICEF, 2008). By 2006, around 120 countries were implementing salt iodization programmes (UNICEF, 2008).

In 2008, the first time in Ukraine, the dietary iodine provision for newborns was assessed in a study of iodine content of colostrums (early breast milk). The median colostrum iodine concentration was 40  $\mu\text{g/L}$ , which is low, compared to similar studies in non-affected populations in Western Europe. After childbirth, 66% of the breast-feeding mothers had UIC (Urinary Iodine Concentration) levels  $<100 \mu\text{g/L}$  (median 66  $\mu\text{g/L}$ ), showing that the insufficient iodine intake in newborns from the first days of life was caused by dietary iodine deficiency of their mothers. Thus dietary iodine deficiency and its consequences are prevalent in an area of Ukraine initially believed to be unaffected by IDD. Under current national legislation, only the use of properly iodized household salt combined with daily iodine supplements would ensure adequate iodine nutrition during pregnancy and infancy in the south-eastern Ukraine (Tananakina *et al.*, 2011). Kazakhstan has greatly reduced iodine deficiency through Universal Salt Iodisation (USI) Programmes. Campaigns by the government and non-profit organisations to educate the public about the benefits of iodised salt started in the mid 1990s, with iodisation of edible salt becoming legally obligatory in 2002.

A study recently published in *The Lancet* gives evidence that mild iodine deficiency in pregnancy may be a factor in a child's IQ (Intelligent Quotient) later in life. Urine samples from 1,040 pregnant women in England were taken and followed up to eight years later by testing their children's IQ scores. It was found out that the women who had lower urinary iodine during pregnancy (indicating that they were mildly to moderately deficient in iodine) were more likely to have children with lower IQ scores at age 8, particularly in oral and reading scores.

A survey conducted by UNICEF in 2007, revealed that, about 95% of households in Ghana were not using iodized salt (UNICEF, 2007). Thus this finding obviously falling short of the national target of 90%, to be achieved in the year, 2015 (GHS, 2005). However, a study done in rural northern Ghana, to assess iodized salt use, it was found out that, there was a 20% household coverage of iodized salt use (Chirawurah, Apanga & Addah, 2015).

A study carried out to assess the iodine prevalence of IDD's in 1994, target group was school children, adolescents, ( 10-19yrs), and women of childbearing age, (15-45yrs), the study showed that, prevalence of total goitre, (TG), was, 20% or more, in 15 of the 27 districts surveyed. Two (2) of these districts had prevalence over 50%, respectively in the Upper East and Upper West regions, (Bongo and Jirapa-Lambussie), ( Asibey-Berko & Orraca-Tetteh, 1995).

## **2.1 Factors Determining The Use of Iodized Salt.**

In the United States, salt producers collaborated with public health authorities and made both iodized and plain salt available to consumers at the same cost. The media also encouraged people to use iodized salt for the prevention of iodine deficiency

disorders (IDD). The Michigan program was highly successful and iodized salt use quickly spread throughout the country. Eventually, household use of iodized salt eliminated iodine deficiency in the North of America. Back in 1955, researchers indicated that 75.8% of U.S. households used only iodized salt. The Salt Institute indicates that nearly 70% of the table salt sold in the United States is iodized, however, none of the salt used in processed foods was iodized. Canada, Australia/New Zealand and much of western Europe long ago addressed the need to ensure availability of iodized salt (Salt Institute, 2013)

Cross-sectional studies of moderate to severely iodine deficient children, have generally indicated impaired intellectual and motor functioning (Qian, Wang & Watkins, 2005).

Results from cross-sectional studies on iodine intake in child growth, were confusing with most studies indicating modest negative correlations (Zimmermann, *et al.*, 2007). Only a few countries such as Switzerland, Scandinavian countries, Australia, USA, Canada, were noted to be iodine sufficient before 1990 (Delange, *et al.*, 2002). Unfortunately, iodine usage are beginning to fall. Incidentally, Australia and the USA, is now slightly iodine deficient (Li *et al.*, 2006).

In a study aimed at assessing prevalence and predictors of sub-clinical iodine deficiency among pregnant women in the Haramaya district, Eastern Ethiopia, it was revealed that, iodine nutritional status of the pregnant women was poor, showing that, women and their children are exposed to iodine deficiency and its adverse effects. The study further showed that, respondents who used iodized salt had 87% lower risk of sub clinical iodine deficiency, than those who did not. Again, the risk of subclinical iodine deficiency, increased by more than three times in women who were illiterate, than in women who were literate. Lack of education among the pregnant was

associated with an increase of three times risk of sub clinical iodine deficiency. The study also showed that, there is scarcity of iodized salt use (Kedir *et al.*, 2014).

Surveys conducted in South Asia revealed that, household iodized salt coverage is only 49%. About 17million babies in this area are born every year, unprotected from brain damage, because of iodine deficiency, thus about 40% of all unprotected births worldwide (UNICEF, 2007). Possible obstacles being, poor monitoring, lack of political commitment to iodized salt usage.

In India, approximately half of the populace have iodized salt coverage. However, availability, as well as coverage is less in poor or low socio-economic populations ( Sankar & Pandav, 2005). The salt is not available in rural markets.

In a study conducted in Australia, to assess nutrition-related knowledge and practices, including iodine supplement use, of both pregnant women and healthcare providers that participate in Antenatal Shared Care (ANSC), it was deduced that, both groups had poor knowledge about vital roles / benefits of iodine during pregnancy. Most women (82%) reported taking a supplement during their current pregnancy, and 70% were taking a supplement containing iodine. Only 26% of the physicians discussed iodine supplementation with pregnant patients. Half (52%) of women's nutritional iodine was from dairy foods, and only 7% came from fish and seafood. Most healthcare providers (74%) expressed interest in receiving more ongoing professional education about iodine in pregnancy.

In another study in Sudan, on; Iodized Salt Consumption in Sudan; Present Status and Future Directions, 1 in 7 households (14.4%) were using iodized salt. People's access to the salt, was between 88% in the regional sector to 1% in the central. Ninety

percent (90%) of the population got access from the local market. Concerning association between iodized salt use and assumed independent variables, it was detected that, educational level of the household head, as well as gender, mode of living, thus either rural or urban, location, wealth index, had strong association with the intake of the salt. Households were likely to use the salt if the head was male, lived in urban area, or where it was easily accessible in the markets. Also use was likely to be high if the house head was educated, and had good socio-economic status. The study concluded that, population coverage with the salt in Sudan was still low. It was also revealed that, the awareness and political support for USI (Universal Salt Iodization) programmes was too weak. In addition national legislation banning the sale of non-iodized salt did not exist. (Mahfouz *et al.*, 2012).

In another related study conducted in 2005, on; Access to iodized salt among the poor and disadvantaged, in North 24 Paraganas District of West Bengal, India, it was revealed that use of the salt was more by the urban, (81.4%), than rural (63.6%), also more by Hindus, (76.2%), than Moslems, (61.9%). It was also detected that, households with good socio-economic status, had a high usage (87.4%), compared to (60.1%). Households in which members had heard of Iodine Deficiency Diseases (IDDs), as well as benefits of the use, of iodized salt, had a higher usage, (81.3%).

Shop owners also disclosed that iodized salt was at a higher price, compelling them to sell the non-iodized salt. Analysis further revealed that, 38% of the shop owners had some knowledge on IDDs, and the TV was the main source (66.7%). (Sen *et al.*, 2010).

A study on ; ‘The Household Use of Iodized Salt, In Sindh And Punjab Provinces, Pakistan; Implications For Policy Makers’, it was realised that, location thus, rural, illiteracy, lack of knowledge, unavailability (25.4%), unawareness, cost (31.4%), taste

(11.9%), were the main factors associated with non- use of iodized salt at household level.(Kahn *et al.*, 2012).

It is estimated that, 64% of households in Sub-Saharan Africa consume iodized salt (UNICEF, 2007). Studies however indicate that, in countries such as, Sudan, Mauritania, Guinea- Bissau, Gambia, have very little coverage, which is less than 10%, whereas in Burundi, Kenya, Nigeria, Tunisia, Uganda, and Zimbabwe, it is indicated to be more than 90%.

In a study to find out Iodine status (UIC) in late pregnancy, as well as Psychosocial Predictors of Iodized Salt Use in rural North Vietnam Households, Socio demographic Characteristics of respondents (women in advanced pregnancy state), included; age, marital status, education, occupation. In this study, it was revealed that, 73.6% of the participants reported the use of some form of iodized salt in their household. One fourth ( $1/4^{\text{th}}$ ) of the respondents were not using either product, thus, traditionally iodized or iodized cooking powders. Educational and Occupational Status, were found to be associated with the use of iodized salt. Use of iodized salt, was found to be lowest in the least educated, and those who were unskilled workers. Further in the study, some women revealed that, they were not using iodized salt because, they were more used to non-iodized products and hence found no reason to change. Another reason given was that, they liked using available local herbal seasonings that contained no salt. A third reason given was that, iodized salt made food taste bitter. Also, respondents stated that, iodized salt was not locally available for buying. Finally, majority of the respondents reported not knowing that, it was important or very necessary to use iodized salt during pregnancy. The study also revealed that, the proportion who reported using any type of iodized salt product, was

quite low, (73.6%), and this is quite alarming, due to the fact that the target population is pregnant women, who have heightened iodine requirements.

According to Wheeler & Van der Haar (2004), household wealth was found to be a significant determinant of the use of iodized salt, in their study done in Mali, Zambia, Uganda, Rwanda, and Turkmenistan. Also educational status was revealed to have no significant association with iodized salt use.

Further studies also indicated that, respondents who had heard about iodine deficiency disorders (IDDs), consumed a significant higher proportion of adequately iodized salt, compared to those who had not, (81.3% as against 68.7%, 95% CI 1.1-1.3). In a similar dimension, the use of iodized salt was high among respondents who were aware of any IDD, and benefits of consuming iodized salt, (Tepas, *et al.*, 2010).

A survey on the knowledge levels and the extent of utilization of iodized salt among the people living in Bia (Juaboso) District, in the Western Region of Ghana, in 2007, it was revealed that,

75.6% of households in the district consumed iodized salt (including households described as occasional users of iodized salt), and knowledge of iodized salt was quite high, as 72% of the respondents knew that not every salt contained iodine (Buxton & Baguune, 2012). In addition, 69.3% indicated that an inadequate intake of iodized salt can lead to the development of goitre. Despite the high awareness level, only 64.6% of respondents indicated that they solely used iodized salt for cooking. According to exclusive users of common salt, they indicated that the price of iodized salt is a little higher than that of common salt. The research also revealed that, continuous and effective use of the electronic media for health education programmes in addition to house-to-house health visits by public health workers to target populations with little

or no access to the electronic media will help to maintain and improve the utilization of iodized salt in the district. The ignorance of people, concerning the importance and sources of iodine, could be a contributory factor to this global public health problem.

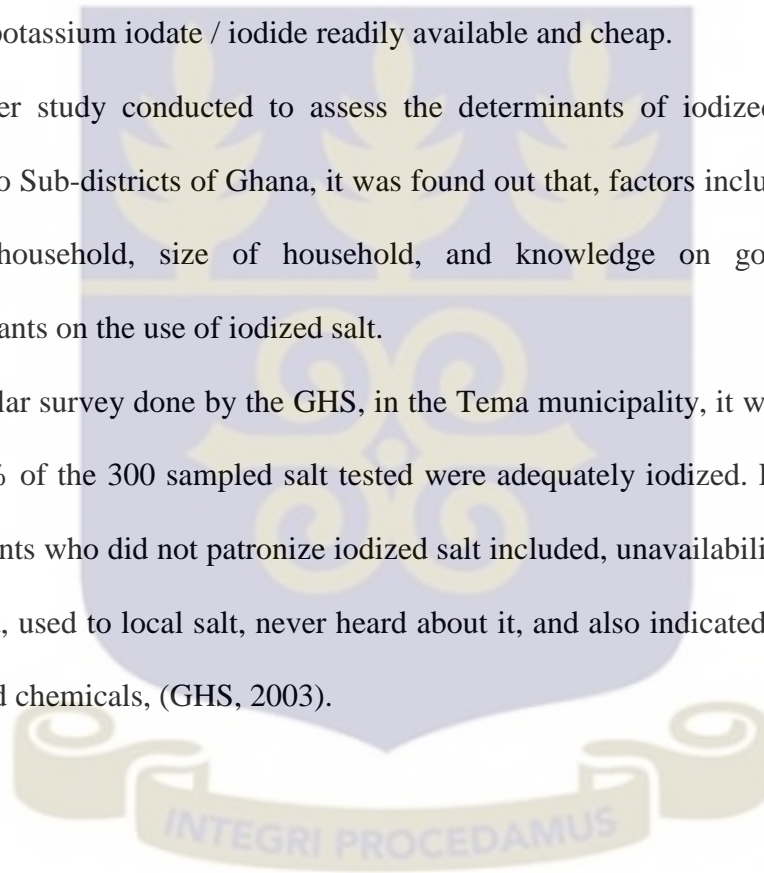
A study carried out by the University of Ghana, in association with the Ministry of Health (MOH), from 1991-1993 on IDD in Ghana, showed that, 98% of respondents had no knowledge on iodized salt (Asibey-Berko, 1995). A survey also conducted in a southern district of Ghana, found out that, knowledge about iodized salt among respondents was 90.4%, which is relatively higher. This high knowledge was due to the Food and Drugs Board Amendment Act, Act,523, of 1996, on USI and ensuring health education, by the MOH and GHS, creating awareness about the importance of iodized salt (Buxton & Baguune, 2012). In addition, joint efforts by UNICEF and GHS, using radio campaigns to educate individuals on the benefits of using iodized salt, resulted in a remarkable improvement of adequate household iodized salt use, thus, 24% in 2009, to 63% in 2011 (UNICEF, 2012). This findings obviously indicates that, intensifying health education by the MOH, GHS, and other relevant stakeholders such as the electronic and print media, could go a long way to increase awareness of the importance of iodised salt usage. In another related study, done in Southern Ghana, the low cost of non-iodized salt, as against iodized salt, accounted for the option to consume common or non-iodized salt, among some non-users, or occasional users of both iodized and common salt (Buxton & Baguune, 2012). Generally the perceived high cost of iodized salt cannot be over looked. Iodized salt is likely to cost more than common salt, due to the additional fortification cost involved (Yamada, Oyunchimeg, Igari, Buttumur, Oyunbileg & Umenai, 1998).

Study conducted in rural Northern Ghana, on iodized salt use, again revealed that, lack of education on the importance of iodized salt use, low knowledge level about

the existence of the law on salt iodization, high cost of iodized salt, non-availability of iodized salt, in addition to other factors, were the main reasons given for low usage (Chirawurah, Apanga & Addah, 2015). A related study performed also indicated that, weak enforcement of the law, as well as limited availability of potassium iodide, including other factors, were identified as being responsible for the inadequate usage of iodized salt in Ghanaian households (UNICEF, 2012). Iodine deficiency is a public health concern, and the Ghana government should support local salt producers, by making potassium iodate / iodide readily available and cheap.

In another study conducted to assess the determinants of iodized salt use in the Kintampo Sub-districts of Ghana, it was found out that, factors including sex / gender of the household, size of household, and knowledge on goitre, were main determinants on the use of iodized salt.

In a similar survey done by the GHS, in the Tema municipality, it was found out that, only 63% of the 300 sampled salt tested were adequately iodized. Reasons given by respondents who did not patronize iodized salt included, unavailability, not important, high cost, used to local salt, never heard about it, and also indicated that, iodized salt contained chemicals, (GHS, 2003).



## **CHAPTER THREE**

### **METHODOLOGY**

#### **3.1 Study Area**

The study was conducted at the Kaneshie Polyclinic. Kaneshie Polyclinic, is government owned, providing general / specialist health services. It is located in Accra, and is NHIS accredited. Kaneshie is a suburb of Accra Metropolitan District, thus the Okaikoi Sub Metro of the Greater Accra Region of Ghana, and is one of the highly populated places in the Greater Accra Region. According to the 2010 census, Accra has a population of 4,010,054, making it the most populous, behind the Ashanti Region. Accra is made up of 10 districts, kaneshie inclusive (GSS, 2014).

#### **3.2 Study Design**

The study design was a descriptive cross-sectional study, among pregnant women attending antenatal clinic at the Kaneshie Polyclinic. This type of design identifies the prevalence of a situation in a given population. Can be used to make inferences about possible relationships or associations (Trochim, 2006).

#### **3.3 Study Variables measured;**

Dependent Variable; The dependent variable of the study, was the ‘Use’ of iodized salt.

Independent Variables; this refers to the Determinants. The determining factors examined included;

- Knowledge
- Availability

- Cost
- Socio-economic Status /Employment Status
- Taste
- Education

### 3.4 Study Population

This comprised pregnant women, attending antenatal clinic at the Kaneshie Polyclinic.

### 3.5 Sample And Sampling Procedure

A sample size of 384 was obtained as shown

- Random sampling technique.
- Sample size(n) estimation;
- Prevalence (p); probability of event occurring- 50%.  $n = (Z^2 pq) / d^2$

Z= 1.96, 95% confidence limit, d=0.05 as the acceptable margin of error, q=1-p, probability of event occurring. Substituting; n=384

Therefore a sample size; (n) of 384 approximately rounded up to (n) = 400 pregnant women (for the purposes of uncompleted questionnaires), was used for the study.

Random sampling technique was used for selecting the sample size, whereby each member would had an equal chance of being selected. An approximate total number of attendance for each day, was obtained, where 40 respondents were randomly picked by balloting for each day, for ten days.

### **3.6 Instrumentation**

A structured questionnaire with closed ended questions was used, as an interview guide.

### **3.7 Data Collection Procedure**

Informed consent was obtained from respondents before administration of the questionnaire. Translations were made where necessary and as appropriate, during the interview session, in circumstances where the respondent was illiterate.

### **3.8 Data Handling and Analysis**

Data was entered into SPSS and exported to Stata (version 13), for analysis. Data was first analysed descriptively and presented as frequencies and percentages on Tables. Chi-Square test was used to determine the association between dependent and independent variables, and presented as proportions with P-values and Fisher's Exact values.

Logistic Regression was used to determine factors significantly associated with iodized salt use / consumption and presented as Odds Ratios (OR) and 95% Confidence Intervals.

The findings from analysis was summarised and appropriate conclusions made.

#### **3.8.1 Pretesting**

The data collection instrument was pretested with antenatal clients at the Dansoman Polyclinic. This helped arrive at the feasibility of the sampling procedures, and data collection instrument, to enable appropriate modifications.

### **3.8.2 Research Assistants**

These were given orientation prior to the study. All data completed were validated daily, where uncompleted questionnaire was not entered, till completed.

### **3.9 Ethical Considerations**

#### **Ghana Health Service Ethical Approval**

Before proceeding with data collection, ethical approval for the study was sought from the Ghana Health Service Ethical Review Committee of the Research and Development Division of the Ghana Health Services.

#### **Approval from study area**

Permission and approval was sought from the hospital administration before data was collected.

#### **Informed Consent**

The objectives and rationale for the study was clearly explained to respondents to obtain their consent. Client privacy and confidentiality was also ensured.



## CHAPTER FOUR

### RESULTS

Table 1 shows Characteristics of study participants.

#### 4.1 Socio-Demographic Characteristics of Respondents

From Table 1, majority (38.0%) of the pregnant women were aged between 25-29 years. Most (72.6%) were married.

A lot (68.1%) of the respondents had education up to the Primary level. Majority (77.4%) of the respondents were Christians. Respondents were mostly (75.9%) Self-employed.

#### KNOWLEDGE

From Table 1, most (98.5%) respondents indicated they had heard of a salt with chemical (iodine) added. Respondents' source of information was mainly the electronic media, thus, Radio (78.0%), TV (85.8%). Only a relatively small (10.3%) number of respondents indicated their source as from health workers.

A majority (79.6%) of respondents reported that not every salt contained iodine. Iodized salt brand, U2, was highly used by respondents, as indicated by a percentage of 78.8.

**Table 1: Characteristics of study participants, Kaneshie Polyclinic, 2015.**

<b>CHARACTERISTIC</b>	<b>FREQUENCY</b>	<b>%</b>
<b>Age</b>		
16-19	17	4.3
20-24	87	21.7
25-29	155	38.8
30-34	112	28.0
35 & Above	29	7.3
<b>Marital Status</b>		
Single	109	27.4
Married	289	72.6
<b>Educational Level</b>		
None	37	9.3
Primary	271	68.1
Secondary/Tertiary	90	22.6
<b>Religion</b>		
Traditional	3	0.7
Christian	308	77.4
Moslem	87	21.9
<b>Employment</b>		
Unemployed	63	16.0
Self-employed	299	75.9
Employed	26	6.6
Student	6	1.5
<b>Heard of Iodized Salt</b>		
Yes	384	98.5
No	6	1.5
<b>Source of Information</b>		
Radio	312	78.0
TV	343	85.8
Printed Matter	11	2.8
Family	22	5.5
Friends	36	9.0
Health Worker	41	10.3
<b>Every Salt Contains Iodine</b>		
Yes	71	20.4
No	277	79.6
<b>Type of salt used</b>		
Iodized	284	71.0
Non-iodized Salt	116	29.0
<b>Brand of iodized Salt Used</b>		
Anapuna	57	15.9
U2	283	78.8
Anapuna & U2	19	5.3

Table 2 shows the perceived benefits of iodized salt use. Majority of (91.0%) respondents indicated that, prevention of miscarriage was not a benefit associated

with the use of iodized salt. Concerning giotre, most (99.3%) were aware that, it's a benefit associated with iodized salt use. 91.0% of respondents indicated good foetal growth as a benefit of using iodized salt. On the issue of promotion of good health, most respondents (98.7%), agreed to this benefit. 80.7% of respondents revealed iodized salt was better than common salt.

**Table 2: Perceived Benefits of using iodized salt**

<b>BENEFITS</b>	<b>FREQUENCY</b>	<b>PERCENTAGE</b>
<b>Prevents Miscarriage</b>		
Yes	131	9.0
No	13	91.0
Total	144	100
<b>Prevents Giotre</b>		
Yes	266	99.3
No	2	0.8
Total	268	100
<b>Encourages foetal growth</b>		
Yes	122	91.0
No	12	9.0
Total	134	100
<b>Good Health</b>		
Yes	225	98.7
No	3	1.3
Total	228	100
<b>Better than Common Salt</b>		
Yes	146	80.7
No	35	19.3
Total	181	100
<b>Do not know</b>	107	100

Table 3 shows problems associated with not using iodized salt. Majority (68.2%) of the respondents indicated that, stunted growth in children was not a problem associated with non-use of iodized salt. A majority (79.4%) of respondents showed that goiter is a problem associated with non-use of iodized salt.

**Table 3: Health Problems due to not Using Iodized Salt**

<b>PROBLEM</b>	<b>FREQUENCY</b>	<b>PERCENTAGE</b>
<b>Stunted growth in children</b>		
Yes	21	31.8
No	45	68.2
Total	66	100
<b>Giotre</b>		
Yes	158	79.4
No	41	20.6
Total	199	100
<b>Mental Retardation in Children</b>		
Yes	26	35.1
No	48	64.9
Total	74	100
<b>Others</b>		
Yes	1	50.0
No	1	50.0
Total	2	100

**TASTE**

Table 4 shows difference in taste of iodized salt. Most (87.7%) respondents indicated that, iodized salt tasted differently from non-iodized salt.

**Table 4: Iodized salt Tastes differently from Non-iodized salt**

<b>TASTE</b>	<b>FREQUENCY</b>	<b>PERCENTAGE</b>
Yes	315	87.7
No	44	12.3
Total	359	100

**AVAILABILITY**

Table 5 shows availability of choice of salt. Majority (98.5%) of respondents indicated their choice of salt is readily available.

**Table 5: Availability of choice of salt.**

<b>AVAILABILITY</b>	<b>FREQUENCY</b>	<b>PERCENTAGE</b>
Yes	383	98.5
No	6	1.5
Total	389	100

**COST**

Table 6 shows respondents' view of cost of their choice of salt. Most (96.4%) of respondents indicated their choice of salt as being affordable.

Table 6: Respondents' view of cost of their choice of salt.

<b>COST</b>	<b>FREQUENCY</b>	<b>PERCENTAGE</b>
Expensive	14	3.6
Affordable	379	96.4
Total	393	100

Table 7 shows association between selected variables and iodized salt use. Employment status had an association with salt use (Fisher's Exact=0.047). The knowledge characteristic of knowing whether every salt contained iodine, had a significant association with salt use (P-value = 0.009). On the benefits of iodized salt, iodized salt being better than common salt, had an association with salt use. (P< 0.001).

There was an association between knowledge, thus in the aspect of knowing health problems due to non-use of iodized salt and health implications as a result of usage of iodized salt. Knowing the health problem of stunted growth, had an association with iodized salt use (Fisher's Exact=0.002).

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**Table 7: Associations between selected variables and iodized salt use.**

Variable	SALT CONSUMPTION (USE)		P – value
	Iodized n(%)	Non iodized n(%)	
<b>Educational level</b>			0.775
None	27(73.0)	10(27.0)	
Primary	189(69.7)	82(30.3)	
Secondary/Tertiary	66(73.3)	24(26.7)	
<b>Employment</b>			0.047 <sup>^</sup>
Unemployed	50(79.4)	13(20.6)	
Self-employed	203(67.9)	96(32.1)	
Employed	23(88.5)	3(11.5)	
Student	4(66.7)	2(33.3)	
<b>Hearing of iodized salt</b>			0.360 <sup>^</sup>
Yes	275(71.6)	109(28.4)	
No	3(50.0)	3(50.0)	
<b>Every Salt Contains Iodine</b>			0.009
Yes	42(59.2)	29(40.9)	
No	207(74.7)	70(25.3)	
<b>Benefits of Iodized Salt</b>			
<b>Prevents Miscarriage</b>			0.062 <sup>^</sup>
Yes	86(65.7)	45(34.4)	
No	12(92.3)	1(7.7)	
<b>Prevents Goitre</b>			1.0 <sup>^</sup>
Yes	199(74.8)	67(25.1)	
No	2(100)	0.00(0.0)	
<b>Good foetal growth</b>			0.060 <sup>^</sup>
Yes	78(63.9)	44(36.1)	
No	11(91.7)	1(8.3)	
<b>Good Health</b>			0.570 <sup>^</sup>
Yes	166(73.8)	59(26.2)	
No	3(100)	0(0.0)	
<b>Better than Common Salt</b>			<0.001
Yes	118(80.8)	28(19.2)	
No	13(37.1)	22(62.9)	
<b>Do Not Know</b>	63(58.9)	44(41.1)	
<b>Problems due to non-use of Iodized Salt</b>			
<b>Stunted Growth</b>			0.002 <sup>^</sup>
Yes	20(95.2)	1(4.8)	
No	26(57.8)	19(42.2)	
<b>Giotre</b>			<0.001
Yes	128(81.0)	30(19.0)	
No	22(53.7)	19(46.3)	
<b>Mental Retardation</b>			0.002 <sup>^</sup>
Yes	24(92.3)	2(7.7)	
No	28(58.3)	20(41.7)	
<b>Others</b>			1.0 <sup>^</sup>

Yes	1(100)	0(0.0)	
No	0(0.0)	1(100)	
<b>Iodized Salt Tasted Differently</b>			<0.001
Yes	238(75.6)	77(24.4)	
No	22(50.0)	22(50.0)	
<b>Choice of Salt is Easily Available</b>			0.139 <sup>^</sup>
Yes	274(71.5)	109(28.5)	
No	4(66.7)	2(33.3)	
<b>Cost of Choice of Salt</b>			0.245
Expensive	8(57.1)	6(42.9)	
Affordable	271(71.5)	108(28.5)	

<sup>^</sup>= Fisher's Exact-value

Table 8 shows logistic regression of respondents factors and iodized salt use / consumption. Employment (P=0.047), knowledge on every salt containing iodine (0.009), iodized salt being better than common salt (P=0.000). The odds of an individual who is self employed was almost 2 times more likely to use iodized salt, compared to unemployed persons [ OR = 1.8, 95% CI(0.9-3.5). Respondents who considered iodized salt as better than common salt, were 0.1 times less likely to use iodized salt.



**Table 8: Odds ratios showing association of variables with Iodized Salt Consumption.**

<b>VARIABLE</b>	<b>CRUDE ODDS RATIO (95% CI)</b>	<b>P value</b>
<b>Employment</b>		0.047
Unemployed	1.00	
Self-employed	1.8(0.9-3.5)	
Employed	0.5(0.1-2.0)	
Student	1.9 (0.3-11.9)	
<b>Every Salt Contains Iodine</b>		0.009
No	1.00	
Yes	2.0 (1.2 -3.5)	
<b>Benefits of Using Iodized Salt</b>		0.05
<b>Prevents Miscarriage</b>		
No	1.0	
Yes	6.3(0.8-51.7)	
<b>Foetal Growth</b>		0.05
No	1.0	
Yes	6.2(0.7-51.6)	
<b>Better Than Common Salt</b>		<0.001
No	1.0	
Yes	0.1(0.1-0.3)	
<b>Problems due to Non-Use</b>		
<b>Stunted Growth</b>		<0.001
No	1.0	
Yes	0.1(0.01-0.7)	
<b>Giotre</b>		<0.0001
No	1.0	
Yes	0.3(0.1-0.6)	
<b>Mental Retardation</b>		<0.001
No	1.0	
Yes	0.1(0.0-0.6)	
<b>Iodized Salt Tasted Differently from Common Salt.</b>		<0.001
No	1.0	
Yes	0.3(0.2-0.6)	

## CHAPTER FIVE

### 5.1 Discussion

The study looked at a quantitative approach of assessing the determinants of the use of iodized salt among pregnant women attending antenatal clinic at the Kaneshie Polyclinic.

The findings of this research suggests that, there are factors influencing the use of Iodized Salt. Individuals with low knowledge about the benefits of iodized salt would normally use non-iodized salt. According to Zimmermann (2011), pregnant women need more iodine than their other women, due to higher production and foetal transfer of maternal thyroid hormone. Moderate to severe Iodine Deficiency during pregnancy increases rates of spontaneous abortion, low birth weight, thereby increasing rates of infant mortality. In effect, the attainment of Millennium Development Goal (Improving Maternal Health, Reduce Child Mortality), becomes adversely affected. In this study, pregnant women were the main target group, with majority of them, (38.8%), falling between the ages of 25-29years, thus within the child bearing age group. This is similar to the demographic characteristic of a similar study conducted on IDD in Ethiopia, where the target group were women in their childbearing ages, in which it was detected that, 34.5%- 37% of the women had developed goitre, taking into consideration the adverse effect of IDD, before, during and after pregnancy (Abuye & Berhane, 2007). These demographic characteristics were also similar to study in rural North Vietnam, where, respondents' age, marital status, educational status, occupational /employment status were considered. With reference to the fact that, almost 39% of Africans are at risk of insufficient iodine intake, there is the need to consider this target group a public health priority, so far as IDDs with its resultant adverse effects during pregnancy are concerned (Anderson *et al.*, 2011).

An appreciable majority (72.6%) of respondents were married. This may probably be due to the fact that, most women in the 21<sup>st</sup> Century now seek a sense of security in relationships, hence entering into proper marriage. Most respondents, (68.1%), had educational level, at least up to the primary school level, thus showing individual's perception on education, hence preferring to gain at least some level of education. From the findings it was revealed that, level of education relatively had no association with the type of salt used, thus either iodized or non-iodized. This may be due to that fact that, individuals are willing to use any salt type (iodized or not ) whether literate or not, depending on the type of salt readily available, even though they may not necessarily be aware of it's benefits or problems associated with use or non-use. In a related survey done in Mali, Zambia, Uganda, Rwanda, it was also found out that, educational status had no significant association with the use of iodized salt ( Wheeler & Van der Haar, 2004 ). However, this finding contradicts results revealed in a study conducted to determine factors influencing the use of adequately iodized salt in Ghana, in which the level of education of the household, especially the head, was found to influence type of salt used. In that study, it was detected that, households where the head had been educated at least to JHS school level, it was more likely to use iodized salt, while those who had no education were less likely to do so, ( Ahiadeke, Ackah, Aryeetey & Acquah, 2012). The findings detected in relation to educational level and type of salt used once again contradicts results revealed in a study conducted in Sudan; on iodized salt consumption; present status and future directions, educational level, had strong association with the intake of salt, (Mahfouz *et al.*, 2012). Again a study on; The Household Use of Iodized Salt, in Pakistan it was realized that, literacy level, were among the main factors associated with either use or non-use of iodized salt at household level (Kahn *et al.*, 2012). Public Health

Intervention Strategies should however focus more on intensifying Public Health Education on iodized salt use taking into consideration benefits of usage, as well as problems associated with non-usage.

Concerning Socio-Economic Status, as reflected in respondents' Employment Status, there was an association, between type of salt used. Majority (75.9%) of the respondents fell under the self-employed category, indicating some level of financial independence. From this category, 67.9% of the respondents consumed iodized salt. The odds of an individual who is self-employed was almost two (2) times more likely to use iodized salt, compared to unemployed individuals. This finding reflects the findings detected in a study conducted to find out factors influencing the use of adequately iodized salt in Ghana, in which the study showed that, the more wealthy a household was, the more likely it was that it would use adequately Iodized Salt and vice versa, (Ahiadeke, Ackah, Aryeetey, & Acquah, 2012). This finding can also be associated to a situation in India, where, iodized salt coverage is less in low socio-economic populations (Sankar & Pandav, 2005). Another study in Sudan; On iodized salt consumption in Sudan, Present Status and Future Directions, agrees with this finding, as it was shown that, Wealth Index were among those assumed independent variables strongly associated with the use of Iodized Salt, (Mahfouz *et al.*, 2012).

In another related study performed in Mali, Zambia, Uganda, Rwanda, Turkmenistan, household wealth was found to be a significant determinant of the use of iodized salt ( Wheeler & Van der Haar, 2004 ).

Further, similar studies conducted in India also reflects this finding as it was also revealed in a study conducted in India; On Access to iodized salt among the poor and disadvantaged, it was shown that, households with good socio-economic status had a higher usage, (87.4%), (Kahn *et al.*, 2012). There is still the need that, necessary

political strategies favour socio-economic development and empowerment. Health interventions should aim at making health information easily assessable and easy to comprehend, for both individuals with either low or high socio-economic status.

In the area of Knowledge, most (98.5%) respondents, indicated having heard of iodized salt, (salt with chemical added). This is an improvement over a similar study done by the University of Ghana, in association with the Ministry of Health (MOH), on IDD's, which revealed that, 98% of the respondents had no knowledge about iodized salt (Asibey-Berko & Orraca-Tetteh, 1995). In another related study, done in a Southern district of Ghana, knowledge on iodized salt among respondents was found to be 90.4%, which is relatively high. There was no association, between hearing of iodized salt and type of salt used. However, of those who indicated hearing of iodized salt, 71.61% of respondents indicated using iodized salt, whereas only 50% of those who indicated not hearing of iodized salt consumed iodized salt. The finding was quite encouraging, as it showed that, awareness creation through health education, also involving the use of the print and electronic media such as the radio on iodized salt use was likely to be on a larger scale, reaching masses. Hence these strategies should be largely intensified. This contradicts results of similar studies in Sudan, which depicted weakness in awareness creation, for universal salt iodization (USI) programmes (Mahfouz *et al.*, 2012). A similar association can be made as another study carried out in Pakistan, reflected knowledge, as well as unawareness as one of the factors associated with non-use of Iodized salt (Kahn *et al.*, 2012). In a similar research done in Bia (Juaboso) District in the Western Region, awareness was found to be quite high, as 66.6% of respondents indicated exclusive iodized salt usage. Furthermore, a similar study in India also supports this finding, as it was also realised that, households in which members had heard of IDD's, as well as benefits of

the use of Iodized salt, had higher usage (Sen *et al.*, 2010). In a similar study, respondents who had heard about IDD's consumed a higher proportion of adequately iodized salt, in comparison to respondents who had not, and also, iodized salt consumption was higher among respondents who were aware of some benefits associated with iodized salt consumption (Tepas *et al.*, 2010).

More than half (79.6%) of respondents indicated that not every salt contains Iodine, depicting an appreciable level of knowledge. Individuals who did not know about salt containing iodine were exposed to consuming any type of salt. There was an association between this aspect of knowledge and iodized salt use. The odds of an individual who indicated every salt contained iodine, was two (2) times more likely to use iodized salt, compared to individuals who indicated not every salt contained iodine. Over 70% of respondents who were aware of this fact consumed iodized salt. This goes back to confirm the fact that, awareness creation to some extent has been encouraging. This results reflects findings of a similar study, done in the Western Region of Ghana, in which, 72% of the respondents indicated that, not every salt contained iodine (Ahiadeke, Ackah, Aryeetey, & Acquah, 2012). Most (85.7%) of respondents revealed the TV as their main source of information, with only 10.3% attributing their source to Health workers, and this was quite alarming. This corresponds with a study in India on iodized salt use, in which it was found out that, TV, (66.7%) was the main source of information among a target population of shop owners, on iodized salt use (Sen *et al.*, 2010). On the issue of health workers as a source of information, a study conducted in Australia, to assess nutrition-related knowledge and practices, including iodine supplement use, of both pregnant women and health care providers, it was found out that, both groups had very poor knowledge on benefits of iodine during pregnancy. This perhaps similarly accounting for health

workers in the clinical setting becoming a small percentage (10.2%) as a source of information. In another related work carried out in the Western region of Ghana, Juaboso, Bia, it was found out that, continuous and effective use of the electronic media for health education programmes in addition to house -to- house visits by public health workers to target populations who have no access to electronic media, will help to improve and maintain iodized salt usage. This implies that, the electronic media is a powerful tool in public health education and hence should be effectively encouraged and intensified. On the issue of the type of salt used, most (71.0%) of respondents used iodized salt only.

Similarly, according to UNICEF (2007), 64% of households in Sub-Saharan Africa consume iodized salt. In Ethiopia, only 20% of households use iodized salt. In Ghana, specifically in the greater Accra Region, only 55% of households consumed iodized salt (GSS, 2008). These still showing low usage as WHO recommend household usage / coverage of 90%. Public Health education on iodized salt use should be intensified, Political Support and Commitment to USI programmes should also be enforced, taking relevant stakeholders into consideration such as, the health sector, Food and Drug Authority, Custom Exercise and Preventive Service.

Majority (78.8%) of respondents revealed U2, as the most common brand of iodized salt used by them, probably due to the fact that it is most often publicized by the media.

Concerning the benefits of Iodized Salt use, very few (9.0%) of respondents were aware it prevents miscarriage, probably due to the fact that, public health education make more emphasis on goitre as a major effect of iodine deficiency. There was no association between this aspect of knowledge and iodized salt use. However, of these respondents who were aware of this fact, 65.7% of them consumed iodized salt.

Majority (99.3%) of respondents indicated it prevents goitre, as a benefit. There was no association between this information (prevents goitre) and iodized salt use. It was interesting to note that, 74.8% of respondents aware of this fact exclusively used iodized salt. Goitre is the most noticeable manifestation of iodine deficiency (WHO, 2011). In the event of pregnancy, majority of respondents (91.0%) indicated it encourages good foetal growth. Thus agreeing with the fact that, moderate to severe iodine deficiency during pregnancy increases rates of spontaneous abortion, reduces birth weight, and increases infant mortality. There was no association between this information and salt use. It was interesting to observe that, 63.9% of these respondents consumed iodized salt. In a related study, in India, where households in which members knew of benefits of iodine usage, had a high usage (81.3%). Similarly a study taken in the Western Region of Ghana, Juaboso, Bia, indicated that, 69.3% of the respondents were aware that, inadequate intake of iodized salt can lead to the development of goitre. Most (98.7%) of the respondents also indicated good health as a benefit of iodized salt use. There was no association between this aspect of knowledge and iodized salt use. However, 73.8% of these used iodized salt. Most (80.7%) of respondents indicated iodized salt being better than common salt. There was an association between this aspect of knowledge and iodized salt use. Respondents aware of this fact were 0.1 less likely to consuming iodized salt, as compared to respondents not aware of this fact. On the issue of health problems associated with not using iodized salt, most (68.2%) of respondents did not consider stunted growth as a health problem. Only 31.8% of the respondents identified stunted growth as a problem. From these (stunted growth as a problem), 95.2% of the respondents exclusively used iodized salt. There was an association between this knowledge and iodized salt use. These particular respondents were 0.1 less likely to

use iodized salt as compared to those not considering it as a problem. It is therefore necessary that, Public Health Education intervention strategies in addition, focus on iodized salt use in pregnancy. With reference to goitre being a problem associated with non-use of iodized salt, most (79.4%) of respondents knew this. There was an association between this area of knowledge and iodized salt use. Respondents aware of this fact were 0.3 less likely to use iodized salt, as compared to those not considering it as a problem associated with non-use.

Only 35.1% of the respondents reported mental retardation as a health problem associated with non-use of iodized salt. From these, 92.3% used iodized salt. There was an association between this knowledge and iodized salt use. Thus respondents aware of this aspect were 0.1 less likely to use iodized salt as compared to respondents not knowing this as a problem due to non-use.

On the issue of taste, thus as to whether iodized salt tasted differently from other salts with no chemical (iodine) added, most (87.7%) of the respondents revealed a Yes. This however did not agree with the indication that, iodine added to salt as potassium iodide or iodate, does not impart colour, taste, or odour to the salt (Manner & Dunn, 1995). Out of these, 75.6% consumed iodized salt. These were 0.3 less likely to use iodized salt, as compared to individuals who indicated iodized salt does not taste different from non-iodized salt. There was an association between taste and iodized salt use. This reflects a study in Pakistan, where it was realised that, taste was among the factors associated with non-use of iodized salt, at household level (Kahn et al., 2012). With Ghana being a salt producing country, it is therefore necessary that the taste of iodized salt processed by producers be appealing enough in order not to put consumers off. Health education on iodized salt use, should be intensified, to address any public misconceptions. For availability, a majority (98.5%) of the participants

showed their choice of salt is available. Considering this, 71.5% of these respondents used iodized salt. There was no association determined between availability and iodized salt use. This can be contradicted in a similar study; On factors influencing the use of iodized salt in Ghana, where, it was detected that, the wide use of non-iodized salt by most people, was due to its availability factor, among other factors (Ahiadeke, Ackah, Aryeetey, Acquah, 2012). In a similar study conducted in Rural Northern Ghana, on; Assessing Iodized Salt Use, it was found out that, respondents gave reasons which included, non-availability as a reason for low usage of iodized salt (Chirawurah, Apanga, Addah, 2015). A similar study done within the Tema Municipality also indicated that, unavailability was a major factor responsible for non-usage of iodized salt ( GHS, 2003 ). Thus this finding contradicts the findings of this study. In another study, in Sudan, it was noted that, households were likely to use iodized salt, if it was easily accessible in the markets (Mahfouz *et al.*, 2012). Further contradiction can be seen as it is estimated that, more than one – third of the African households do not have access to iodized salt (Anderson *et al.*, 2010). Example in Ethiopia, only 20% of households use iodized salt. In the United States, salt producers work with Public Health authorities to ensure availability of iodized salt. Also in a similar dimension, countries such as, Canada, Australia, and much of Western Europe, long ago addressed the need to ensure availability of iodized salt (Salt Institute, 2013). Generally, great progress has been made in Africa, on elimination of IDD, largely due to the increased household availability.

Cost of respondents' choice of salt was also examined. Majority (96.4%) of respondents indicated their choice of salt as being affordable. There was no association between cost and iodized salt use. Generally, the cost of iodized salt cannot be neglected. According to Yamada *et. al.*(1998), iodized salt costs more than

common salt, due to the fortification process. Similarly, a related study in Southern Ghana revealed a low cost of non-iodized salt, as compared to iodized salt, accounting for the decision to consume non-iodized salt. Another study on assessing iodized salt use, in rural Northern Ghana, also revealed a factor accounting for non-use of iodized salt as high cost of iodized salt ( Chirawurah, Apanga, & Addah, 2015). These findings contradicting the findings in this study. Also a study in Pakistan showed cost as among the factors associated with non- use of iodized salt at household level, thus not agreeing with this finding. (Kahn *et al.*, 2012). Again, another study in India, detected that, shop owners indicated that, iodized salt was at a higher price, compelling them to sell the non-iodized salt (Sen *et al.*, 2010). Also another study carried out in Ghana, Western Region, it was indicated that, exclusive users of common salt were of the view that, the price of iodized salt was a little higher than that of common salt, or unionized salt. In this study however, respondents generally considered cost of iodized or non-iodized salt as relatively affordable and same. This, reflecting strategy adopted by the US, where Public Health authorities made the price of both iodized and non-iodized salt at the same cost.



## CHAPTER SIX

### CONCLUSION AND RECOMMENDATIONS

#### 6.1 Conclusion

Generally, reported use of iodized salt was relatively low ( 71.0%) thus, still falling short of the national target of 90% household consumption of iodized salt, to be achieved in 2015. Knowledge on the availability of iodized salt was quite high, but that did not show in it's usage. .

Factors such as, educational status, cost, availability, indicated no association with iodized salt use. Employment status (socio-economic), knowledge on benefits of iodized salt use as well as knowledge on problems associated with non-usage and taste were identified in this study, to affect iodized salt intake.

#### 6.2 Recommendation

- Public health education by the Ministry of Health (MOH), Ghana Health Service (GHS), and other stakeholders, such as the media, should intensify effective educational campaign nationwide, with focus on women, particularly pregnant women, to increase knowledge on iodized salt, thereby increasing usage.
- The Food and Drugs Board should ensure that, iodized salt does not taste differently from non-iodized salt or the taste of iodized salt is appealing enough.
- Iodine Supplementation should also be included during routine Antenatal Care, to reduce the risk of developing IDD's during pregnancy.
- National IDD survey, should periodically be carried out, to update the country for future planning.

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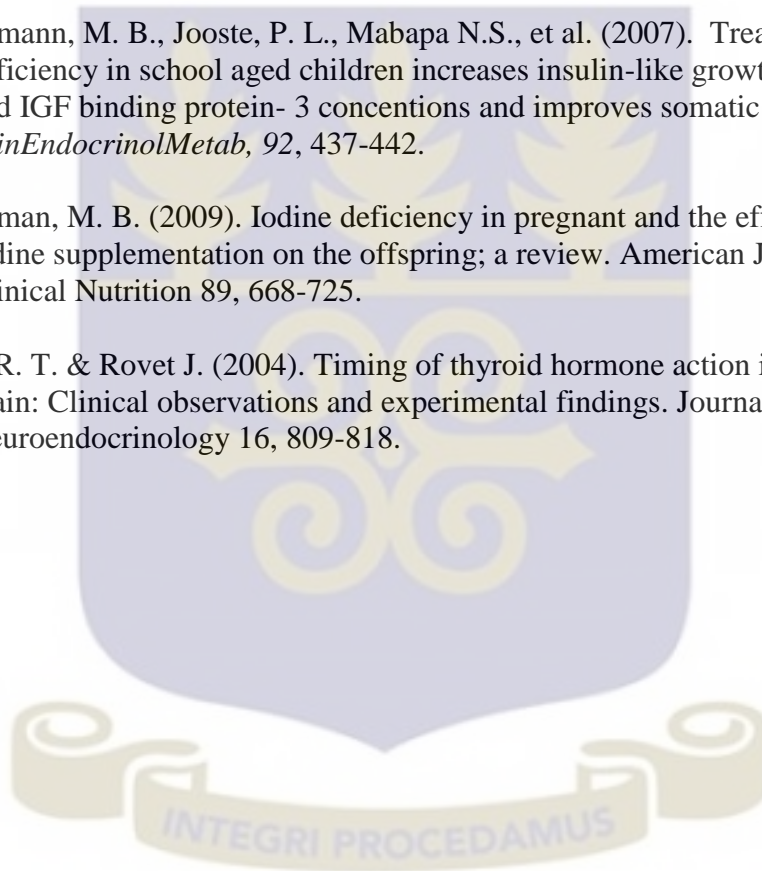
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**Appendix (A): Questionnaire**

**A STUDY ON DETERMINANTS OF THE USE OF IODISED SALT AMONG  
PREGNANT WOMEN ATTENDING ANTENATAL CLINIC AT THE  
KANESHIE POLYCLINIC.**

Dear Respondent,

My name is Marian Tweneboa, a Master of Public Health student from the University of Ghana, Legon. I am conducting a study on The Determinants of the Use of Iodised Salt Among Pregnant Women Attending Antenatal Clinic At The Kaneshie Polyclinic. You are assured that the answers you give will be kept strictly confidential. There are no risks associated with this study. The findings of this study will be disseminated to the hospital and will also help District Health Management Teams, (DHMT), responsible for planning health promotional and educational programmes.

Participation in this study is voluntary, however, I would be grateful if you would consent to voluntarily participate in this study by responding to the questions below.

Thank You.

Do you have any concerns about the study that you wish to be addressed ? Please Tick the boxes below;

Yes

No

If yes, please indicate your concern below;

.....  
.....

If you have any questions later, please contact Marian Tweneboa on; (0205791450 or [tweneboaaboagyewaa@gmail.com](mailto:tweneboaaboagyewaa@gmail.com)) or The Ghana Health Service Ethical Review Committee Administrator, Hannah Frimpong (0243235225 or 0507041223).

**Informed Consent**

I have read the information given or the given information has been read and duly explained to me in a language I easily understand. My concerns about this study have been duly addressed. I now voluntarily agree to participate in this study knowing that I have the right to withdraw from the study, at any time without it affecting my ability to access Antenatal Health Care at this facility in the future.

.....  
(Name of Participant)                      (Signature)                      (Thumbprint)                      (Date)

**Interviewer’s Statement**

I the undersigned, have explained this consent to the subject in English/Ga/Twi/Ewe/Hausa and that, he/she understands the purpose of this study, procedures to be followed as well as the risks and benefits.

The participant has agreed to fully participate in this study.

Name of Researcher/Assistant.....

Signature of Researcher/ Assistant.....

Date.....

Please provide the appropriate responses to the questions below;

### Questions

Respondent's ID [       ]

#### (A) Socio-demographic Characteristics

1. Age  
How old are you?.....
2. Marital Status
  - a. Single [    ]
  - b. Married [    ]
  - c. Divorced [    ]
  - d. Separated [    ]
  - e. Widowed [    ]
3. Educational level
  - a. None [    ]
  - b. Primary [    ]
  - c. Secondary / Tertiary [    ]
4. Religion
  - a. Traditional [    ]
  - b. Christian [    ]
  - c. Moslem [    ]
  - d. Hindu [    ]
  - e. Others [    ]

#### SOCIO-ECONOMIC

5. Employment Status
  - a. Unemployed [    ]
  - b. Self-employed [    ]
  - c. Employed [    ]
  - d. Student [    ]

#### KNOWLEDGE

6. Have you heard of a salt with chemical (iodine) added to it ?
  - a. Yes [    ]
  - b. No [    ]
7. If Yes to (6), where did you hear of it

- |                   | Yes | No  |
|-------------------|-----|-----|
| a. Radio          | [ ] | [ ] |
| b. TV             | [ ] | [ ] |
| c. Printed Matter | [ ] | [ ] |
| d. Family         | [ ] | [ ] |
| e. Friends        | [ ] | [ ] |
| f. Health Workers | [ ] | [ ] |

8. Does every salt contains iodine?

- a. Yes [ ]  
 b. No [ ]

9. Which type of salt do you use?

- a. Iodized salt only  
 b. Uniodized salt

10. If using iodized salt specify brand ( Show Samples of Both Iodized Salt & Common/Uniodized Salt). .....

11. Benefits of cooking with iodised salt include;

- |                                  | YES | NO  |
|----------------------------------|-----|-----|
| a. Prevents miscarriage          | [ ] | [ ] |
| b. Prevents goitre               | [ ] | [ ] |
| c. Encourages good foetal growth | [ ] | [ ] |
| d. Promotes good health          | [ ] | [ ] |
| e. Better than common salt       | [ ] | [ ] |
| f. Do not know                   | [ ] | [ ] |

12. Not taking iodised salt can lead to health problems such as;

- |                                   | YES | NO  |
|-----------------------------------|-----|-----|
| a. Stunted growth in children     | [ ] | [ ] |
| b. Goitre                         | [ ] | [ ] |
| c. Mental retardation in children | [ ] | [ ] |
| d. Others                         | [ ] | [ ] |
| e. Do not know                    | [ ] | [ ] |

### TASTE

13. Does iodised salt tastes differently from salt with no chemical (iodine) added ?

- a. Yes [ ]  
 b. No [ ]

AVAILABILITY

14. Do you easily get your choice of salt when you need it ?
- a. Yes [ ]
  - b. No [ ]

COST

15. How would you consider the price of your choice of salt ?
- a. Expensive [ ]
  - b. Affordable [ ]



## Appendix I: Consent Form

**Title;** Determinants of the use of iodized salt among pregnant women attending Ante-natal clinic at the Kaneshie Polyclinic.

**Name of Principal Investigator;** Marian Tweneboa

**Status;** Student of The School of Public Health, University of Ghana, Legon.

**Address;** Department of Population, Family and Reproductive Health, School of Public Health, College of Health Sciences, University of Ghana, Legon. E-mail ; [tweneboaaboagyewaa@gmail.com](mailto:tweneboaaboagyewaa@gmail.com)

telephone; 0205791450

**General Information about research;** Iodine deficiencies are a global issue, with many countries battling with it, particularly in developed countries. The most vulnerable groups being, pregnant women, infants and children. It is reported that deficiencies during pregnancy may lead to still birth, spontaneous abortions, low birth weight, poor cognitive development of the unborn baby, cretinism.

Current studies in Ghana revealed that people are still not using iodized salt. This study seeks to find out factors influencing the use of iodized salt, particularly among pregnant women, attending ante-natal care at the kaneshie polyclinic.

**Possible Risks/ Discomforts;** The study has no risks to the participants. However some questions and the duration in answering the questionnaire (about 20 mins), may possibly distress some respondents.

**Measures to Minimize Risks;**

It is optional for participants to answer the questionnaire, and a respondent is free to decline answering a question, or withdrawing participation at any point in time, and will have no negative consequence.

**Possible Benefits;**

Apparently no direct benefit to the respondent. However, information provided by clients will be useful to District Health Management Teams,(DHMT), responsible for planning health promotional and educational programmes, on the use of iodized salt in Ghana, and to other countries, struggling with this problem of IDD, particularly among pregnant women and infants, which contributes to maternal, foetal and infant complications, indirectly resulting in maternal and infant mortality.

**Confidentiality;** All research materials ( questionnaire, consent,), will be stored in locked file cabinets of principal investigator.

electronic files will be made only accessible to the researcher. Questionnaire for each respondent will be coded with an identification number.

**Compensation;**

There will be no monetary or nonmonetary compensation for participants.

**Contacts for additional information;**

For more information and questions on the study, individuals in the study community can call; Marian on 0205791450.

**VOLUNTEER AGREEMENT;**

The above document describing the benefits, risks and procedures for the research title (Determinants on the use of iodized salt among pregnant women attending ante natal care at the kaneshie polyclinic), has been read and explained to me.

I have been given an opportunity to have any questions about the research answered to my satisfaction.

I agree to participate as a volunteer.

.....  
Date Sign./ Mark / Thumb Print

If volunteers cannot read for themselves, a witness must sign;

I was present while the benefits, risks and procedures were read to the volunteer. All questions were answered and volunteer has agreed to take part.

.....  
Date Sign./Mark/ Thumb Print of Witness

I certify that the nature and purpose, potential benefits, possible risks associated with participating in this research have been explained to the above individual.

.....  
Date Signature of person who obtained consent