

SCHOOL OF PUBLIC HEALTH  
COLLEGE OF HEALTH SCIENCES  
UNIVERSITY OF GHANA

DIETARY SUPPLEMENT USE AND DETERMINANTS AMONG THE ELDERLY IN THE  
KETA MUNICIPAL AREA

BY TAMAKLOE MAKAFUI SOLACE



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

JULY 2013

## DECLARATION

I, Tamakloe Makafui Solace, do hereby declare that all the work reported here-in with the exception of the citations which have been duly acknowledged are the result of my own research carried out under the supervision of Dr. Richmond Aryeetey.

.....

Tamakloe Makafui Solace

.....

Dr. Richmond Aryeetey



## DEDICATION

I dedicate this work to my dearest mum Veronica. Your love, support and encouragement has always kept me going.



## Acknowledgements

I want to first thank my Supervisor, Dr. Richmond Aryeetey, for his knowledge, suggestions, guidance and patience in completing this project. Next, I want to thank my statistical consultant Emmanuel Ayifah for all of his assistance in completing the statistical analysis for this project. Most importantly I want to thank my family especially Michael Kofi Fosu for his unending support during all my year of schooling, my mum; Veronica Anobah and my brother; Edward Tamakloe for their help during data collection not forgetting my fieldworkers and all those who contributed and supported in one way or the other to make this research a success. God bless you all.



## ABSTRACT

Dietary Supplements use has been found to be increasing among the adults especially the older adults in the developed countries. However, there are no known studies on dietary supplement use among the elderly in Ghana. A descriptive cross-sectional study was conducted to determine patterns of dietary supplement use and determinants among the elderly in the Keta municipal area, Volta region. This involved a one-time data collection on socio-demographic and health characteristic and also use of supplements, using a questionnaire. Study participants included 580 male and female elderly (65 years+) residing in the Keta Municipal. A multistage sampling technique was used in selecting the study participants. Analysis included descriptive statistics of the socio-demographic and health information and Chi square test to compare proportions. Logistic regression analysis was also done to determine relationship between independent variables and use of supplements. Results showed that multivitamins were the most commonly used dietary supplements used (41.74%) and a total of 242 (41.72%) of the 580 respondents in this study reported using at least one dietary or herbal supplements in the past week. A considerable 17.77% use herbal supplements. While a greater proportion reported using the supplement daily, dietary supplement use was more likely to be predicted by urban residency ( $p=0.001$ ). There was no significant difference between proportions of supplements users regarding the type of supplement being used and demographic characteristics but a significantly high proportion of the elderly with at least one diagnosis of chronic illness use daily ( $p=0.04$ ).

**TABLE OF CONTENT**

Declaration -----	i
Dedication -----	ii
Acknowledgement -----	iii
Abstract-----	iv
Table of Contents-----	v-vii
List of Tables -----	viii
List of Figures -----	ix
List of Abbreviations -----	viii
Chapter One	
1.0 Introduction-----	1
1.1 Background -----	1-2
1.2 Statement of Problem-----	2-3
1.3 Justification-----	3
1.4 Research Questions-----	3
1.5 Objectives-----	4
1.5.1 General-----	4
1.5.2 Specific objectives -----	4
Chapter 2	
2.0 Literature Review -----	5-13
Chapter 3	
3.0 Methods -----	14
3.1 Study Design -----	14

3.2 Study location/Area-----	14
3.3 Variables -----	15-16
3.4 Study Population-----	16
3.5 Sampling -----	17-18
3.5.1 Sample size -----	17
3.5.2 Sampling method-----	18
3.6 Data Collection Techniques/Method & Tools-----	19-20
3.7 Quality Control-----	20
3.8 Data Processing and Analysis-----	20-21
3.8.1 Statistical Methods-----	20-21
3.9.0 Ethical considerations-----	21
3.9.1 Data storage/ Security and Usage-----	21
3.9.2 Pre-test-----	21
Chapter 4	
4.0 Results-----	22-34
4.1 Description of Study Participants-----	22
4.2 Description of Health Status-----	23
4.3 Dietary Supplement Use-----	24-25
4.4 Types/ variety of Dietary Supplements used-----	27
4.5 Determinants of Dietary Supplements Use and Pattern of Use in specific Populations-----	31
Chapter 5	
Discussions -----	32-35

## Chapter 6

6.1 Conclusions -----	36
6.2 Recommendations-----	36-37
References-----	38-40
Appendices-----	41-53
Appendix I Questionnaire on dietary supplement use and determinants among the elderly in the keta municipal area-----	41-45
Appendix II Results from binary logistic regression-----	46
Appendix III List of Supplements-----	47-49



**LIST OF TABLES**

Table 4.1 Background characteristics of Respondents-----	22-23
Table 4.2 Description of Health History-----	24
Table 4.3 Dietary Supplement Use in specific populations-----	26
Table 4.4 Types of Dietary Supplements Used among Specific groups of elderly population-----	29
Table 4.5 Pattern of dietary supplement Use in specific groups of elderly population----- -----	30
Table 4.6 Predictors of dietary/ herbal supplement Use from multiple logistic regression - -----	31

## **LIST OF FIGURES**

Figure 1- Supplement Use among the elderly

Figure 2- Types of supplements Used by the elderly

Figure 3- Dietary supplement use by content type

## CHAPTER 1

### 1.0 INTRODUCTION

A dietary supplement is any product (other than tobacco) intended to supplement the diet that bears or contains one or more of the following dietary ingredients: a vitamin, a mineral, an herb or other botanical, an amino acid, a dietary substance for use by man to supplement the diet by increasing the total dietary intake, or a concentrate, metabolite, constituent, extract, or combination of any these ingredients and is intended for ingestion in the form of a pill, capsule, tablet, or liquid (U.S FDA, 1994). Dietary supplement is not represented for use as a conventional food or as a sole item of a meal or the diet; and is labelled as a dietary supplement. Types of dietary supplements include single vitamins/minerals like vitamin C, vitamin E and Calcium tablets, multivitamins/multiminerals, combinations of only vitamins or with minerals, herbal products like ginseng, garlic pills and other non-vitamin, non-mineral supplements (Balluz et al., 2000; Dorsch and Bell, 2005). Their use is generally common among middle aged adults, pregnant women and the elderly. They are also used by adolescent athletes (Dorsch and Bell, 2005).

Dietary supplements serve as a source of essential nutrients (Balluz, Kieszak, Philen, & Mulinare, 2000). They substantially complement daily intakes of several micronutrients among most users (Murphy et al., 2007). Supplements are also used for decreasing susceptibility to health problems, enhancement of athletic performance, stress adaptation, antioxidation, stimulation of the immune system and enhancement of cognitive performance (Balluz et al., 2000; Palmer et al., 2003).

In the elderly, dietary supplements are used to address malnutrition resulting from sub-optimal dietary intake. Malnutrition is a common problem in the elderly because there is impaired absorption of certain micronutrients among this age group (I. Elmadfa and Meyer, 2008). Dietary studies among the elderly have also shown that although there is increased need of some vitamins and minerals, there is inadequate intake of micronutrients (Payette & Gray-Donald, 1991; Vitolins et al., 2000; Elmadfa and Meyer, 2008). This places the elderly at nutritional risk. However studies have shown the contribution of dietary supplements to increasing the adequacy of essential nutrients in the aged (Murphy et al., 2007). Use of dietary supplements has been associated with factors like older age, being female, higher education and income, health status and healthful behaviours (K. Radimer et al., 2004; Guo, Willows, Kuhle, Jhangri, & Veugelers, 2009; Wiygul et al., 2005). Findings from the study on the Nutrition Situation of the Elderly in Ghana however, indicated a problem of nutrient inadequacy among this age group (Steiner-Asiedu et al., 2010).

## **1.2 Problem Statement**

Excessive and inappropriate use of dietary/herbal supplements among older adults has been recognized as a significant public health problem (Ness et al., 2003; Loya et al., 2009; Nisly et al., 2010). Vitamins and minerals in dietary/ herbal supplements may interact with certain drugs and result in adverse clinical outcomes caused by an increase or decrease in nutrient or drug concentrations or the synergistic effect of combined compounds (Nisly et al., 2010). Older adults are especially vulnerable to these adverse

effects because they have more health conditions and are usually on multiple medications.

Much evidence however exists on increasing dietary supplement use among the elderly in the developed country settings like United States of America (Balluz et al., 2000; Kennedy, 2005a; Gardiner et al., 2006; C. L. Rock, 2007). Although there have been some experimental studies on dietary supplements use among pregnant women and children in Ghana, (Adu-Afarwuah et al., 2008), there are no known studies on the use of dietary supplement among the elderly. Patterns of use of these supplements are not known in Ghana and other developing countries. Therefore information on dietary supplements use can provide evidence on the proportions using them, patterns of use, types that are most commonly used, who are likely to use these supplements and associated factors.

#### **1.4 Justification**

Information regarding patterns of dietary supplement use, the types that are most commonly used, who are likely to use these supplements, associated factors and whether the choice of dietary supplements can serve as guidance for nutritional care of the elderly. This will serve as a guide in monitoring and regulating dietary supplement use. It will also encourage the use of methods that may improve the assessment nutrient adequacy of dietary supplements. Evidence on the predictors of usage will also inform on areas of focus for future intervention.

**Research Questions:**

- I. How common is Dietary Supplement Use among the elderly?
- II. What types of supplements are being used by the elderly and for what purpose?
- III. What is the use pattern among the elderly in Keta municipal?
- IV. What are the sources of dietary supplements used by the elderly?
- V. What factors predict the use of dietary supplements among the elderly in Keta municipal?

**1.5 OBJECTIVES****1.5.1 General Objective**

The purpose of this study was to determine the pattern of dietary supplement use and determinants of use among the elderly in Keta municipality, Volta region.

**1.5.2 Specific Objectives**

- To determine the proportion of the elderly in the Keta municipal area who use dietary supplements
- To describe types and pattern of dietary supplements use by the elderly in the Keta municipality
- To determine the sources of dietary supplements used by the elderly in the Keta municipality
- To Identify factors that predict dietary supplement use among the elderly

## CHAPTER 2

### 2.0 LITERATURE REVIEW

#### 2.1 Population Ageing

##### 2.1.1 Ageing and Health

As a result of gains in life expectancy, the older population in most countries is rapidly growing (United Nations, 2001a; World Health Organization, 2000). According to United Nations projections in a just few years to come those 65 years and above would outnumber the under 5 year olds (Kinsella and Velkoff, 2001). However, minimal attention has been given to health of the aged and their economic consequences in developing countries.

Based on the experience of epidemiological and demographic transition in developed nations, an increase in degenerative non-communicable diseases is projected with the increases in adult life expectancy (Naidoo et al., 2010). In 2005 it was estimated that 77% of a total of 37 million chronic disease deaths that occurred worldwide, were in people aged above 60 (Tunstall-Pedoe, 2006).

The WHO- SAGE project assessing the Health status and quality of life among older adults in rural Tanzania showed that quality of life decreases with age and poor health status was associated with increasing age and among women (Mwanyangala et al., 2010). Although Ghana's age-sex structure has not changed much from 1960 - 2000, census results has shown that the aged population has risen from 0.6 million to 2.3 million over the period (Mba, 2004). The proportion of the rural elderly persons rose significantly from 4.1 percent of the total population in 1960 to 7.9 percent in 2000 (Mba, 2004). A

shift in Ghana's population age structure towards the older age (geriatric) groups is anticipated by researchers (Mba, 2010)

### **2.1.2 Ageing and Functional Capacity**

Increase in old age longevity combined with increase in non-communicable diseases is found to result in loss of physical and cognitive functioning and growing levels of disability among the aged (Naidoo et al., 2010). The increase in disability will result in reduced capacity for work among older workers, loss of autonomy, and the need for substantial care in old age, which is enormously costly in terms of both economics and well-being. However, findings revealed that delaying the onset of cognitive impairment and reducing its disabling consequences could reduce disability among the aged (Jagger et al., 2009). About 25% decline in disability among those aged 65 years and above has been recorded in the United States, between 1982 and 2001 (Naidoo et al., 2010).

## **2.2 Ageing and Nutrition**

### **2.2.1 Nutrient intake and nutritional status of the elderly**

Nutrition is of critical importance to health. Adequate nutritional status is associated with the cognitive and physical functional capacity of the aged; certain micronutrients are protective against cognitive decline (Sharkey et al., 2012; Steiner-Asiedu, Mombo Pelenah, Bediako-Amoa, & Danquah, 2010). However, Inadequate nutrition is a common problem affecting the functional and physical status of the elderly (Ortiz-Andrellucchi et al., 2009). Some elderly persons have difficulty getting adequate nutrition because of age- or disease-related impairments in chewing, swallowing, digesting, and absorbing



nutrients. Their nutrient status may also be affected by decreased production of digestive enzymes or drug-nutrient interactions(Blumberg and Couris, 1999; Ibrahim Elmadfa and Meyer, 2008). Studies have shown that the absorption and micronutrient status of Calcium, vitamin D and vitamin B12 are influenced by age(Ahluwalia and Ahluwalia, 2005; Heuberger, 2009; Bueche, 2009; Brown *et al.*, 2008 as cited in (Steiner-Asied *et al.*, 2010). A survey on micronutrient status in Viennese elderly which revealed a moderate calcium deficiency in 17% of the subjects. Vitamin D status was more critical with 22% of the subjects being moderately and 3% severely deficient (Elmadfa, Blachfelner, Freisling, 2004 as cited in Elmadfa & Meyer, 2008). Also, a study on the mean micronutrient intake from diet (excluding supplements) in an elderly population was lower than the Canadian dietary recommendations for folate, vitamin D, calcium, magnesium, and zinc in both males and females(Payette and Gray-Donald, 1991).

In many developing countries, undernutrition is a serious problem among the older age group. The overall prevalence of undernutrition among older people in sub-Saharan Africa is reported to range from 6% in Cameroon, and 48% in Ghana ( Kimokoti and Hamer, 2008 as cited in (Cheserek *et al.*, 2012). This was found to have positive association with functional ability(Chilima, 2000). A study to determine the nutrition situation of the elderly visiting a center in Accra, Ghana it reported that only 39.1% of the subjects were food secure with the rest being food insecure at different Levels (Steiner-Asiedu *et al.*, 2010)

It is reported that generally, older adults in developing countries are at risk of malnutrition because of poverty, poor access to health care, and diverse diets (Maruapula and Chapman-Novakofski ,2007; Ngatia, Gathece, Macigo, *et al.*,2008 as cited in

(Cheserek et al., 2012) Therefore, older people require an adequate and varied diet to assure optimal health and nutrition.

### **2.3.0 Dietary supplements and their Importance**

Dietary supplements serve as source for essential nutrients. (Balluz, Kieszak, Philen, & Mulinare, 2000). Supplement use was reported to sizably increase daily intakes of several micronutrients among middle-aged Americans(Archer et al., 2005). In the Hawaii-Los Angeles Multi-ethnic Cohort though the prevalence of nutrient adequacy from food was similar for users and non-users of multivitamin supplements, nutrients from multivitamin supplements significantly increased the mean prevalence of adequacy across 17 nutrients for older adults. The adequacy of vitamin A, vitamin E, and zinc intakes was particularly improved. (Murphy et al., 2007). However Payette and Gray-Donald (1991) suggested that vitamin Supplementation rather increased nutrients already adequately supplied by the diet among 82 healthy, free-living elderly subjects aged 65-89 years whose nutritional status were assessed in a study.

In a randomized control trial, although nutritional status of malnourished elderly subjects improved from baseline to week 24 due to dietary supplementation, there was no significant difference in the nutritional status between groups. This result suggests that providing nutritional supplement to already malnourished elderly does not improve quality of life (Edington et al., 2004) Prevention of malnutrition is therefore the key to better nutritional status of the elderly.

### **2.3.1 Sources of Dietary Supplements**

Almost half of dietary supplement purchases by users in a study in the U.S were made from sources such as pharmacies, grocery shops, and mail order or internet sources (Palmer et al., 2003). However, no published information was found on the sources of dietary supplement in Ghana.

### **2.3.2 Trends of supplement use in General Population / associated factors**

In the United States, two nationally representative surveys; the National Health and Nutrition Examination Survey (NHANES) and the National Health Interview Survey (NHIS) have examined dietary supplement use in the United States (Webb, 2009). Both surveys found older age and healthy lifestyle habits to be associated with herbal and dietary supplements intake. However, while the NHIS results found high education and higher income level among a higher proportion of users, the NHANES III found no associations based on these characteristics (Radimer, Subar and Thompson, 2000).

Also in a study aimed to assess dietary supplement use and its association with micronutrient intakes and adequacy among 2,195 US men and women aged 40 to 59 year, Supplement use was found to be common among middle-aged Americans. Supplement use is also more common among women, older participants, more educated participants and those with higher income (Balluz et al., 2000; K. Radimer, B. Bindewald, J. Hughes, B. Ervin, C. Swanson, and M. F. Picciano, 2004). Same trends were found in a study conducted among health care professionals in the United States, where higher supplement use was also associated with older age, being female and high knowledge of dietary supplements (Gardiner et al., 2006).

Also in a cross sectional study to determine dietary supplement use among men with prostate cancer, about 73% of respondents use dietary supplement. The use is common among the highly educated and those who are health conscious. (Wiygul et al., 2005). In the Hawaii-Los Angeles Multiethnic Cohort (MEC), women reported using a multivitamin supplement at least once weekly for the past year (Foote et al., 2003 as cited in Murphy et al., 2007). The most commonly used were multivitamins (60%), calcium (40%), vitamin B (31%), vitamin C (30%), fish oil (24%), vitamin E (23%), vitamin D and folate (15% each)(Gardiner et al., 2006). No information was however found on the use of dietary supplements in sub Saharan Africa or Ghana

### **2.3.3 Determinants and motivation for supplement use**

There has been increasing popularity in the use of dietary supplements (Balluz et al., 2000). Reasons reported by most people for dietary supplements intake, include decreasing their susceptibility to health problems such as stress, colds, heart attacks, and cancer, and increasing their energy. (Balluz et al., 2000). Of 997 respondents in a study, about 28–35% reported treatment of disease as their intention for dietary supplement use. Other intentions included: dieting (14%); enhancement of athletic performance (10%); aiding sleep (10%); stress adaptation, antioxidation, or nutrition (9%); suicide (9%); stimulation of the immune system (4%); recreational stimulus (2%); and enhancement of cognitive performance (2%). Less than 1% of intakes were for use of supplements as an aphrodisiac, as an abortifacient, treatment for menstrual symptoms, foiling of drug tests, and smoking cessation. Multiple intentions of use were also reported(Palmer et al., 2003).

The most common reasons for use of dietary supplements among pregnant women were to relieve nausea and vomiting ( 25%)(Tsui et al., 2001).

Influence from Family or friends was found to be a major determinant of dietary supplement use among 997 dietary supplement users in the U.S (66%). Whereas physician referral was reported by 7% about 5% was referrals from non-conventional caregivers such as herbalists(Palmer et al., 2003)

#### **2.3.4 Consequences of dietary supplement intake**

Millions of people worldwide take multivitamin and mineral supplements, hoping to promote health, but few studies have documented their benefits(Bender, 2002). Findings from intervention trial among elderly resident in nursing and elderly homes lead to the conclusion that dietary supplement is effective for counteracting the development of malnutrition in this population. The results of this trial further, suggested that it is effective as treatment for decreasing function in a subgroup of institutionalized elderly with low BMI(Manders, 2006). Calcium and vitamin D dietary supplementation was also found to moderately reduce total body bone loss and the incidence of nonvertebral fractures in both men and women 65 years of age or older(Dawson-Hughes et al., 1997).

A number of epidemiologic studies have also suggested association between dietary supplement use and cancers. (Lin et al., 2009); (Kristal et al., 1999). Antioxidant nutrients such as ascorbic acid, vitamin E and the carotenoids (eg, beta carotene) are said to have a major preventive role against carcinogenesis (Lin et al., 2009; Krinsky, 1998 as cited in (Kirsh et al., 2006). Vitamin E in the Alpha-Tocopherol Beta-Carotene (ATBC) Cancer Prevention trial has been found to have a secondary protective effect against

prostate cancer in male smokers (Wiygul et al., 2005). However, in a randomized double-blind, placebo-controlled trial 624 out of 8171 women had a confirmed diagnosis of invasive cancer, a total number of 176 cancer deaths was recorded (Lin et al., 2009). Findings from this study and other clinical trials suggest there were no statistically significant effects of long-term dietary supplementation. Any combination of the antioxidants like vitamin C, vitamin E or beta carotene did not reduce the risk of cancer or the risk of dying from cancer (Lin et al., 2009). In a systematic review by El-Kadiki and Sutton (2005) it was found that evidence for routine use of multivitamin and mineral supplements to reduce infections in elderly people is weak and conflicting.

Although dietary supplements have been shown to improve health, results from some studies have shown that dietary supplements could also have serious adverse effects (Palmer and Howland In: Ford M et al, eds. 2001 as cited in Palmer et al., 2003). Such effects especially if they are rare, could remain undetected without adequate surveillance efforts. Reviewers assessing adverse events associated with dietary supplements in an observational study found these negative events to be mostly associated botanical substances ma huang, guarana, ginseng and non-botanical substances chromium, melatonin, and zinc. About 31% of these events were moderate to worse (Palmer et al., 2003).

#### **2.4.0 Use of Herbal Supplements & Complementary Alternative Medicine (CAM)**

Although studies on the safety and efficacy of herbal products are limited, data from the NHIS CAM survey showed widespread of Herb and natural supplement use in the US adult population in 2002 (Kennedy, 2005). It was extrapolated from the data obtained that

38.2 million adults in the United States used natural herbs in 2002(Kennedy, 2005). There was some evidence that herbs are being used as an alternative to conventional medical treatment.

## CHAPTER THREE

### 3.0 METHODS

#### 3.1 Study Design

This was a descriptive cross sectional survey involving a one-time data collection on dietary supplement intake through face-to-face Interviews using semi-structured questionnaires.

#### 3.2 Study Area

The Keta Municipality is one of the eighteen (18) administrative areas in the Volta Region of Ghana. Keta is the capital and administrative centre of the municipality. The municipality lies within Longitudes 0.30E and 1.05E and Latitudes 5.45N and 6.005N. It is located east of the Volta estuary, about 160km to the east of Accra, off the Accra-Aflao main road. Out of the total surface area of 1,086km<sup>2</sup>, approximately 362km<sup>2</sup> (about 30 per cent) is covered by water bodies. The largest of these is Keta Lagoon. The municipality consists of 32 villages with a population of 133,661 of which 13422 are above 65 years. They are predominantly of the Anlo ethnic group. Ewe is the language spoken by the inhabitants. Fishing is the main occupation of the people with other business ventures like fish processing, salt mining, cassava processing, sugar-cane juice processing and coconut oil extraction.



### 3.3 VARIABLES

#### **Dependent variables**

Use of dietary supplement regarding proportion of supplement users was determined through self-reported use of dietary supplements in the past month by the respondent and also through identification of supplement content information on medication bottles or packs if available at home. In this study, a dietary supplement was considered to be any product (other than tobacco) intended to supplement the diet that bears or contains one or more of the following dietary ingredients: a vitamin, a mineral, an herb or other botanical, an amino acid, a dietary substance for use by man to supplement the diet by increasing the total dietary intake, or a concentrate, metabolite, constituent, extract, or combination of any these ingredients and is intended for ingestion in a form a pill, capsule, tablet, or liquid.

Type of dietary supplement used was considered in terms of whether supplement was processed by a licensed factory or a locally made product without certification. Type of supplement was also categorized according to the micronutrient composition of the supplement; single or multiple vitamins and mineral, a combination or herbal supplements. The supplement container was checked to determine if it was locally prepared or factory processed or the respondent was asked if the container was unavailable. The names of supplements recorded during data collection were also regrouped according to content types as multivitamins, single vitamins and minerals, combinations and herbal supplement after checking their contents on their containers and the internet.

Pattern of supplement usage was considered in terms of frequency of use per day/week. Respondents were asked to report how many days in the past week they used the supplement and how many times they used it in a day to describe/ determine the pattern of usage.

### **Independent variables**

The independent variables were Sex, Age in completed years, and level of highest Education, Income source, Income level and Perceived/ reported Health Status. The Sex of each participant was recorded on the questionnaire at the time of the interview. Each respondent was asked to report their Age in completed years, Level of highest education, Income source(s) and level. All sources of monthly income were recorded whether it was from remittance, salary/wage, stipend/pension or any combination. Total amount of income from all source per month were recorded to determine income level.

For Perceived/reported Health status, participants reported if they agree or disagree with three statements relating their health status. Responses were then scored ranging on the scale of 1 to 3 for disagrees, neither agrees nor disagrees and agrees. The scores were summed to determine the perceived health index for each individual. The scores were classified as low, medium or high using the inter-quartile ranges. Scores within the 25<sup>th</sup> percentile were considered as low perceived health status and a high perceived health status if within the 75<sup>th</sup> percentile. Information on diagnosis of any chronic illness in the past 10 years was based on self-reports by respondents.

### **3.4 Study Population**

The study population consisted of elderly of both sex aged 65 years and above living in urban and rural communities of the Keta municipality. The population consisted of individuals with different backgrounds; levels of education, employment status and sources of income.

#### **Inclusion Criteria for Participant**

Non-institutionalized male and females 65 years and above who resides in the Keta municipal area were eligible for the study.

#### **Exclusion Criteria for Participant**

All males and females less than 65 years and the elderly who do not reside in the Keta municipal but just on a visit to the area were not eligible to participate in the study. Also those who do not consent to participate in the study were excluded.

### **3.5 Sampling**

#### **3.5.1 Sample Size**

Using the Cochran equation calculating sample for proportions of large populations (Glenn, 1992)

$$n_0 = \frac{Z^2 pq}{e^2}$$

Where  $n_0$  is the sample size,  $Z^2$  is the abscissa of the normal curve that cuts off an area

$\alpha$  at the tails ( $1 - \alpha$  equals the desired confidence level,  $e$  is the desired level of precision,  $p$  is the estimated proportion of an attribute that is present in the population, and  $q$  is  $1-p$ ).

Since there is a large population of elderly but the variability in the proportion that use supplement is not known; therefore assuming a maximum variability  $p=.5$  and also using a confidence interval of 95%,  $\pm 5\%$  precision,  $q=.5$  (Glenn, 1992)

$$no = (1.96)^2 (.5)(.5)$$

$$\text{-----} = 385$$

$$(.05)^2$$

### **Correcting for design effect due to multistage cluster sampling**

Using a design effect of 1.5

$$385 * 1.5 = 576$$

A sample size of 580 was used; of which 165 were males and 415 females. This was based on the proportion of elderly in the Keta municipal area; about 30% males and 70% females (GSS, 2011). About 61% of the sample was from the rural communities and the others from the urban communities.

### **3.5.2 Sampling Method**

A multistage sampling technique was used since there was no available sample frame. First, 3 out of the 6 sub-municipalities were selected randomly. In the next step, 2 catchment areas of the health directorate were also selected randomly from each of the 3 sub municipalities. A quota was allocated to each of these catchment areas in proportions

based on their sizes. The study subjects were then sampled from homes in a total of 24 communities (both rural and urban) from these catchment areas. Any elderly met in each home was interviewed after informed consent was gained. At most, two subjects were interviewed per household. Where there were more than two elderly in a household, balloting was used to select subjects. The male and female ratio of the study sample was representative of their proportion in the municipal area; about 30% males and 70% females (GSS, 2011). There were about ten (10) refusals.

### **3.6 Data Collection Technique & Tools**

The study involved a one-time data collection on dietary supplement intake and associated factors through face-to-face Interviews using semi-structured questionnaire.

#### **3.6.1 Demographic and Health Data**

Data collected on socio-demographic information included sex, age, place of residence, highest level of education, occupation if any, current source of income and health condition. Questions were asked on diagnosis of any chronic illness in the last 10 years. Respondents were also asked whether they agree or disagree with 5 statements adopted and modified from the RIING project Health Perception questionnaire. Birth dates were obtained from the National Health insurance Card or baptismal cards if available to reduce burden on the elderly trying to remember age.

#### **3.6.2 Dietary & herbal supplement Use Assessment**

Dietary supplement Use was assessed using a questionnaire. Any product in the form of a pill, capsule, tablet, liquid or powder containing single or multiple vitamins, mineral,

herbs or other botanicals, amino acids and other substances or a combination of any of these ingredients or their constituents that is taken by mouth in order to supplement one's diet was considered as a Dietary supplement. Each participant was asked whether he/ she had taken any vitamins, minerals, or other dietary supplements, including prescription supplements and herbs in the last month. If Yes, then the interviewer further asks to see the participant's supplement containers, which were checked for manufacturer's label and dosage information. The name of each supplement was also recorded from the label if available. In cases where the container or label was unavailable, the interviewer asked the participant to report the exact name of the product or, if not known, the supplement type, for example, multivitamin, vitamin C. Participant were then asked to report how long they had been taking the product, how often they use it in the past 7 days and how many times they used it in a day. Reasons for supplement use were also recorded.

### **3.7 Quality Control**

Research Assistants were trained and given Standard Operating Procedure (SOP) to follow in data collection and handling of filled questionnaires. Completed forms were manually checked by researcher for accuracy and correctness and sometimes went back to the field for verification when the need arises.

## **3.8 DATA PROCESSING AND ANALYSIS**

### **3.8.1 Statistical Methods**

The data was entered in excel and imported into STATA 11 for analysis. The analysis included descriptive statistics of the socio-demographic and health information

(proportions). Scores for responses for questions relating to perceived/reported health status were summed up to get the Perceived Health Index (PHI) for each individual. The percentile ranges were used to classify the PHI as low, medium and high. Chi square test was used to compare proportions and to determine if there were associations between each of the independent factors and the dependent factors. Ttest was used to compare mean frequency of use between specific groups of the elderly. Logistic regression analysis was also used to determine the impact of the various independent variables on dependent variable categories. Only variables that were significant in the bivariate analyses were included in the logistic regression.

### **3.9.0 Ethical Consideration/Issues**

The protocol was submitted for ethical clearance at the Ghana Health Services and permission was sought from the traditional authorities of the study area. Informed consent was also sought from each participant before recruitment into the study. The purpose of the study as well as the assurance of confidentiality was explained to the participants.

### **3.9.1 Data storage/ Security and Usage**

Hard copy completed questionnaires were stored in a locked file cabinet and access was limited to only the Principal Investigator and Supervisor. The electronic data was also password protected.

## **3. Pretest or Pilot Study**

Pretest of the questionnaire was done using 10 elderly in Dzelukorpe.

## CHAPTER 4

### 4.0 RESULTS

#### 4.1 Description of Study Participants

Demographics as presented in Table 1 show that of a total of 580 respondents about 72% were females. A mean age of  $74.39 \pm 7.96$  years was recorded. Most of the respondent (60.86%) had no formal education and a greater proportion (61.38%) was living in the rural communities. Although most of the respondents (52.59%) were unemployed, a great number (about 35.52%) were still working. About 87% of these elderly receive an average monthly income of  $110.74 \pm 154.85$  Ghana Cedis of which about 58.28% is solely from remittance.

**Table 4.1 Background Characteristics of Respondents (N=580)**

Socio-demographic characteristic	Frequency	Percentage (%)
<b>Sex</b>		
Male	165	28.45
Female	415	71.55
<b>Age (years)</b>		
65-69	176	30.34
70-74	141	24.32
75-79	105	18.10
80-84	89	15.34
85-89	39	6.73
90-94	19	3.27
95-104	11	1.90
<b>Location</b>		
Rural	356	61.38
Urban	224	38.62
<b>Level of highest Education</b>		
None	353	60.86
Primary	73	12.59
JHS/ middle	106	18.28
SHS/O/A level	13	2.24
Post-Secondary	7	1.21
Tertiary	28	4.83



**Table 4.1b Background Characteristics of Respondents (N=580)**

<b>Socio-demographic characteristic</b>	<b>Frequency</b>	<b>Percentage (%)</b>
<b>Current Occupation</b>		
Unemployed	305	52.59
Retired	69	11.90
Civil Servant	3	0.52
Self-employed	201	34.66
Other	2	0.34
<b>Income Source</b>		
Salary/wage	91	15.69
Wage & Stipend	1	0.17
Salary/wage and Remittance	18	3.10
Stipend/pension	45	7.76
Stipend/pension & Remittance	10	1.72
Remittance	338	58.28
Other	1	0.17
None	76	13.10
<b>Summary Statistic</b>		
	Mean $\pm$ SD	Min, Max
Monthly Income level (GhC)	110.74 $\pm$ 154.85	5, 1150

#### 4.2 Description of Health Status

About 92.41% (536) of the 580 elderly respondents in this study reported diagnosis of at least one chronic illness or pains. The majority (66.55%) reported joint pains and only about 2.07% reported waist pains. 272 out of the 580 elderly (46.90%) also reported diagnosis of High blood pressure. Results from perceived health index showed that a majority of about 51.90% of the respondents perceived and reported their health status as low. Only 27.76% had a high perceived index.

**Table 4.2 Description of Health History**

<b>Chronic illness</b>	<b>Frequency N</b>	<b>Percentage (%)</b>
Diabetes	20	3.45
High Blood pressure	272	46.90
Stroke	34	5.86
Arthritis	43	7.41
Joint Pain	386	66.55
Swollen joint	36	6.21
Back pain	169	29.14
Waist pain	12	2.07
insomnia	168	28.97
Others	35	6.03
<b>Perceived health index</b>		
5-7 (Low)	301	51.90
8-10(midium)	118	20.34
11-15(High)	161	27.76
<b>Summary statistics</b>		
	Mean $\pm$ SD	Min, Max
<b>Perceived health index</b>	8.2293 $\pm$ 3.0625	<b>5, 15</b>

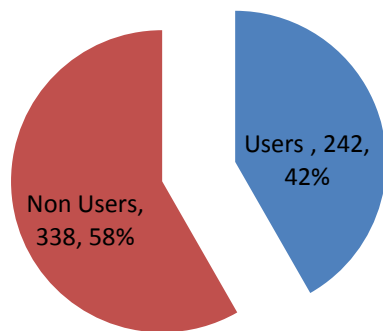
### 4.3 Dietary Supplement Use

A total of 242 (41.72%) of the 580 respondents in this study reported using at least one dietary or herbal supplements in the past week. Majority (47.52%) reported prescription by health worker as the basis for supplement use whilst only about 2.48% reported prescription by an herbalist. However a considerable 30.17% use the supplement based on self-prescription and 5.79% were recommended by friends or others. Sources of the dietary supplements included hospital/clinic, pharmacy, private marketers, herbalists, children both abroad and in Ghana and other relatives. About 47.52% of the supplements were provided at the hospital whilst 3.72% were provided by a herbalist and 1.65% self-prepared at home.

Generally looking at the results, 91.32% reported daily use of the supplements within the past one week. A mean of  $2.07 \pm 0.88$  was recorded as frequency of use in a day. However there was no significant difference in the mean frequency/ pattern of dietary supplement use in specific groups of elderly population.

Health improvement/maintenance was the main motivation for the supplement use among the studied population (90.50%). Other reasons for dietary supplement use included age retardation, stress/fatigue reduction, weight loss, stamina, treatment of chronic disease and for blood. A minimum of 20 pesewas and a maximum of 200 Ghana Cedis are spent on a dosage of supplement whilst 36.55% were provided under the National Health Insurance. 97.52% of the supplements had manufacturer's label whilst 93.8% had dosage information. Only about 0.05% of those who use supplements reported ever experiencing side effects whilst 21(3.62%) reported having knowledge of side effects of the supplements they are using.

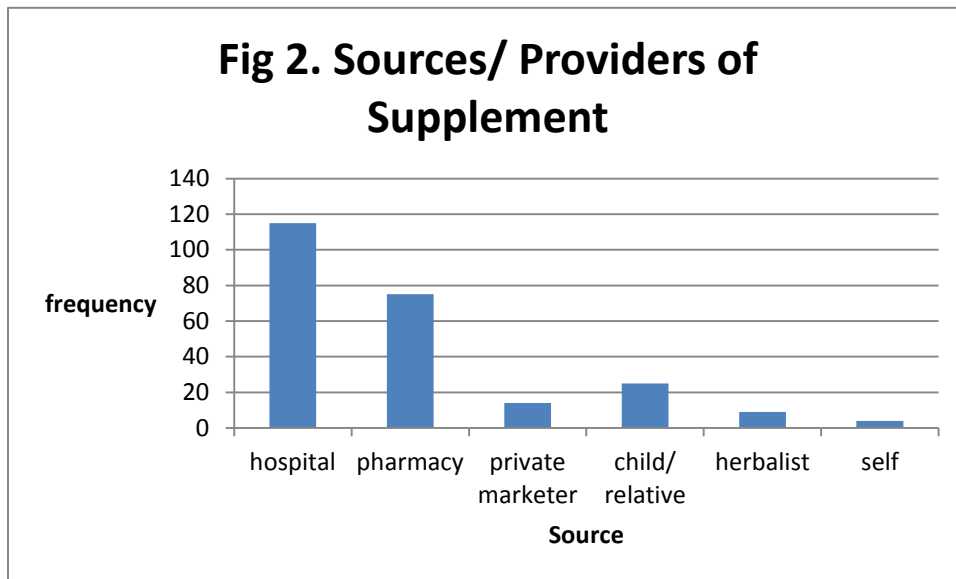
**Fig 1. Dietary Supplement Use among the Elderly**



**Table 4.3 Dietary Supplement Use in specific populations**

Variable	Proportion of Non Users (%)	Proportion of Users (%)	Pearson's Chi2, P-value
<b>Sex</b>			
Male	61.21	38.79	0.82
Female	57.11	42.89	(0.37)
<b>Location</b>			
Rural	50.00	50.00	10.28
Urban	63.97	22.41	(0.001)*
<b>Education</b>			
None	62.89	37.11	7.90
Educated	51.10	48.90	(0.005)*
<b>Chronic disease</b>	58.21	41.79	0.013
No Chronic disease	59.09	40.91	(0.91)
<b>Perceived health Index</b>			
5-7(low)	62.13	37.87	
8-10 (medium)	51.69	48.31	4.31 (0.12)
11-15 (high)	55.90	44.10	

\*p<0.05, Perceived health index lower quartile (5-7) for low perceived health status and the upper quartile (11-15) considered as high perceived health status

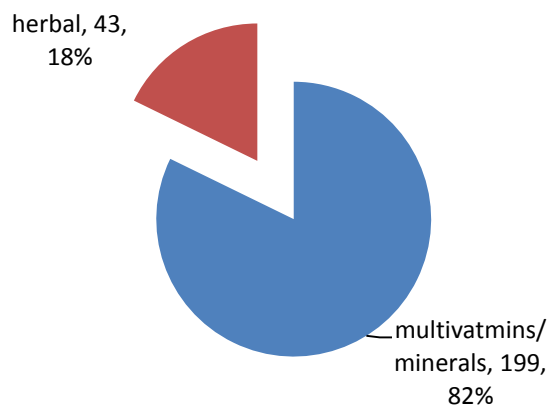


#### 4.4 Types/ variety of dietary Supplements Used

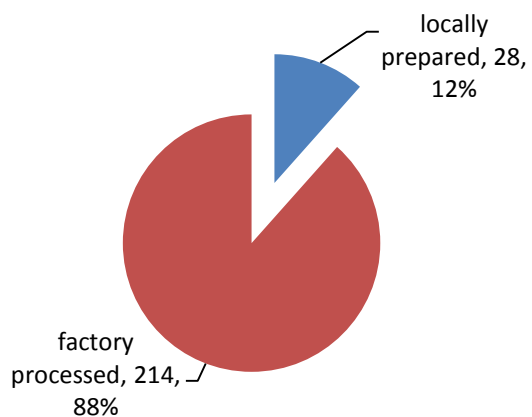
Based on the composition, the dietary supplements were classified into two main groups; multivitamins/minerals and herbal supplements. Results as shown in fig.3 indicated that a greater proportion 82.23% use multivitamins/minerals whilst 17.77% use herbal supplements. About 11.57% of the supplements being used were locally prepared and 62.4% were also manufactured in Ghana.

However as shown in table 4.4 and 4.5 there was no significant difference regarding types of supplements used and frequency of supplement use among groups of the elderly with different characteristics. The use of licensed factory vs locally processed supplements was not significantly different among males and females, the educated and uneducated or among rural and urban residents. Similar results were recorded for the use of vitamin- mineral supplements vs herbal supplements.

**fig 3. Type of Dietary Supplement Used by Composition**



**Fig 4. Types of Dietary Supplements Used**



**Table 4.4 Types of Dietary supplements used among specific groups of elderly population**

Variable	Factory processed (%)	Locally Prepared (%)	Pearson's Chi2, P-value	Multi vitamins-Minerals (%)	Herbal/CAM (%)	Pearson's Chi2, P-value
<b>Sex</b>						
Male	87.50	12.50	0.074	79.69	20.31	0.39
Female	88.76	11.24	(0.77)	83.15	16.85	(0.54)
<b>Location</b>						
Rural	90.00	10.00	0.68	83.85	16.15	0.50
Urban	86.61	13.39	(0.41)	80.36	19.64	(0.48)
<b>Education</b>						
None	88.55	11.45	0.004	82.44	17.56	0.01
Educated	88.29	11.71	(0.95)	81.98	17.77	(0.93)
<b>Chronic disease</b>						
	89.73	10.27	4.99	83.04	16.96	1.33
No chronic disease	72.22	27.78	(0.03)*	72.22	27.78	(0.25)
<b>Perceived health Index</b>						
5-7(low)	89.47	10.53		81.58	18.42	
8-10 (medium)	96.49	3.51	8.35 (0.02)*	89.47	10.53	3.18 (0.48)
11-15 (high)	80.28	19.72		77.46	22.54	

\*P &lt;0.05

**Table4:5 PATTERN OF DIETARY SUPPLEMENT USE IN SPECIFIC GROUPS OF ELDERLY POPULATION**

<b>Variable</b>	<b>Obs (n)</b>	<b>Mean</b>	<b>S.E</b>	<b>95%CI</b>	<b>Df</b>	<b>p-value</b>
<b>Sex</b>	64	6.44	0.20	6.04- 6.83		0.10
Male					240	
Female	178	6.72	0.08	6.57- 6.88		
<b>Location</b>						
Rural	112	6.61	0.13	6.35- 6.87	240	0.62
Urban	130	6.68	0.09	6.50- 6.87		
<b>Education</b>						
None	131	6.73	0.09	6.55- 6.90	240	
Educated	111	6.56	0.13	6.30- 6.82		0.29
<b>Chronic disease</b>	224	6.69	0.08	6.53- 6.84	240	0.08
No Chronic disease	18	6.17	0.38	5.36- 6.97		



#### 4.5 Determinants of Dietary Supplement Use and patterns of Use in specific populations

Results from the multiple logistic regressions as shown in table 4.6 indicate that whilst residence location may be predictor for dietary supplement use in the Keta municipal area, amount of monthly income is not associated with supplement use in the area. Supplement use is less likely among the rural communities of the municipal. Although a higher proportion of the educated were supplement users as shown in table 4.3, education was not a predictor of supplement use in this municipal area. There was also no significant association between supplement use and sex, age, perceived health status or diagnosis of any chronic illness.

**Table4.6: Predictors of dietary/herbal supplement Use (dependent variable) from multiple logistic regression**

Variable	OR	95% CI	P-value
Location	0.65	0.45-0.95	0.03*
Highest level of education	1.15	0.97-1.35	0.10
Amount of income /month	1.00	1.002-1.004	0.03*

## CHAPTER 5

### DISCUSSIONS

Studies of this kind in the United States have shown high use of dietary/herbal supplements among the older adults(Vitolins et al., 2000; Radimer et al., 2004), there is no record of such studies in Ghana. The data from this study thus provide such information.

#### 5.1 Dietary/ Herbal Supplement Use

The results in this study showed average usage of dietary supplements among the elderly 41.72%, of which about 26.45% were males and 73.55% were females. This result is not quite different from result from previous studies in the United States (Vitolins et al., 2000; Cheryl L. Rock, 2007). These results may indicate that women are more concerned with personal health than men or feel more of a need to take supplements due to concerns such as cosmetic enhancement, prevention of osteoporosis, and post-menopausal changes in body function(Chen et al., 2005a). These higher percentages of users being females may be due to the higher proportion of females enrolled into the study.

A significant proportion of the elderly with education and those living in the urban communities of the municipal area were using dietary supplements, this is similar to studies (Radimer et al., 2000; Chen et al., 2005b). Since the health facilities and most pharmacies are located in the urban communities the people in these communities can easily access to the supplement because the results also showed that most of the dietary supplements were from the hospitals and pharmacies. With regards to education, one

explanation may be that those with no formal education lack knowledge and information on dietary supplements and their importance.

## **5.2 Types and Sources of Dietary supplements Used**

As shown in reports from many other studies relating to dietary supplement use in the general population, multivitamins were found also in this study to be the most commonly used dietary supplements (Foote et al., 2003; Gardiner et al., 2006). It is interesting to find that most supplement users choose products providing multiple nutrients rather than single vitamins/minerals for the purpose of improving their health. This selection suggests that these adults are either not worried about deficiencies in specific nutrients but may be more concerned about nutrient adequacy in general or it may also be that they lack knowledge on their nutrient needs and the contents of the supplement. Since the hospitals/clinics are the major suppliers of these supplements to this group, it may also be that the health workers possibly think providing a multivitamin-type supplement assures against nutrient deficiencies among these group. Some few studies showed that use of dietary supplements improve nutrients intake among the elderly (Ervin and Kennedy-Stephenson, 2002; Sebastian et al., 2007). Although other studies found that females were more likely to take multivitamin/ mineral supplements, this study found no significant difference between the males and females with regards to the type of supplement they use. There was no significant difference relating to type of supplement being used by users in the rural and urban communities although supplement use was associated with living in the urban communities. No significant difference was also found between proportions of supplements users regarding the type of supplement being used and all

other demographic characteristics. However a greater proportion use factory processed supplements.

### **5.3 Pattern of dietary Supplement Use**

It was not surprising to find a greater proportion reporting daily use of supplement with no significant difference between groups. Since more than half of the population perceived their health to be low, they are using the supplements more regularly hoping to improve their health. Considering the fact that the elderly suffer poor health as shown by the result, (the high proportion who reported diagnosis of chronic illness in the last 10years) a greater proportion stated improvement/maintenance of health as the main motivation for supplement use.

### **5.4 Predictors of Dietary Supplement Use**

A large proportion of previous studies on dietary supplements found that dietary supplement use among the general population has been consistent with specific demographic characteristics like females, older adults, higher level of education and income. Women for example were more likely to use dietary supplement when compared to men(Kathy Radimer et al., 2004; Foote et al., 2003; Rock, 2007). This study unlike other studies did not show any association between supplement use and demographic characteristics like sex, age, higher level of education and chronic illness although a greater proportion of educated elderly were using dietary supplements(Balluz et al., 2000; Radimer et al., 2004). Higher monthly income was also not likely to predict use of dietary supplement in this municipal area; although it was in studies in other countries ( Balluz et al., 2000; Radimer et al., 2004; Chen et al., 2005). However a significantly high number

of elderly resident in urban location were more likely to use dietary supplement. One possible reason for less supplement usage among those in the rural communities may be financial. As mentioned earlier another reason may be the unavailability or inaccessibility of pharmacies and hospitals/clinics in the rural communities since greater proportion of those who use supplements received them from the hospital/clinic.

There was also no significant association between supplement use and diagnosis of chronic illness and perceived health status unlike other studies that showed that dietary supplement users were more likely to have been diagnosed with a disease and to perceive their health status as being good(Jasti et al., 2003). Although a high proportion of the elderly use dietary supplements, less than 4% were aware of any side effect of the supplements. There is therefore a great need for more education among this group.

### **Limitations**

One of the limitations of this study was missing data for monthly income due to respondent's refusal. Also due to time limitation a larger sample size could not be used and other factors like dietary intake could not be assessed. There were also some few refusals of people to participate in the study because of failed promises in other past projects. Others also wanted monetary incentives before they would participate.

## CHAPTER 6

### CONCLUSIONS

It can be concluded from this study that close to half of the elderly (41.72%) in the Keta municipal area use dietary /herbal supplements and it is being used on regular basis (daily). Although a greater proportion uses multivitamins and vitamin/mineral combinations about 18% also use herbal supplements and a high proportion also use the supplements based on self-prescription (30.17%).

### RECOMMENDATIONS

It is important that healthcare providers are knowledgeable to the fact that a large proportion of this population does consume dietary supplements so that steps can be taken to educate the elderly on the topic. This will also encourage efforts to monitor dietary supplement use behaviour and the use of methods that may improve the assessment nutrient adequacy of dietary supplements.

There should also be provision of policies for the regulation of sales and use of dietary supplements since it was found that a high proportion was self-prescribed.

Although findings from this study gave an overview of dietary supplement use in the Keta municipal area, I would recommend a nation-wide survey with a larger sample size to give a better description of supplement use in the country. Differences in supplement use should also be assessed for supplement use across the country. This will help determine if factors like cultural difference influence use of dietary supplements.

Although this study has shown factors that may influence dietary supplement use, information on actual dosage intake and adequacy of the supplements in relation to their nutrient needs could not be collected. Future research should focus on determining the adequacy of these supplements especially the herbal supplements for which nutrient composition is unknown. More information is also needed on reasons for the use of a particular type of supplements among the elderly. Knowledge of supplements should also be assessed in these individuals.

## REFERENCES

- Archer, S.L., Stamler, J., Moag-Stahlberg, A., Van Horn, L., Garside, D., Chan, Q., Buffington, J.J., Dyer, A.R., 2005. Association of dietary supplement use with specific micronutrient intakes among middle-aged American men and women: the INTERMAP Study. *J. Am. Diet. Assoc.* 105, 1106.
- Balluz, L.S., Kieszak, S.M., Philen, R.M., Mulinare, J., 2000. Vitamin and mineral supplement use in the United States: results from the third National Health and Nutrition Examination Survey. *Arch. Fam. Med.* 9, 258.
- Bender, D.A., 2002. Daily doses of multivitamin tablets: Regular consumption will probably do you no good, with a few exceptions. *BMJ* 325, 173.
- Chen, S.-Y., Lin, J.-R., Kao, M.-D., Hang, C.-M., 2005a. The usage of dietary supplements among the elderly individuals in Taiwan. *Asia Pac. J. Clin. Nutr.* 14, 230–237.
- Chen, S.-Y., Lin, J.-R., Kao, M.-D., Hang, C.-M., 2005b. The usage of dietary supplements among the elderly individuals in Taiwan. *Asia Pac. J. Clin. Nutr.* 14, 230–237.
- Cheserek, M.J., Tuitoek, P.J., Waudu, J.N., Msuya, J.M., Kikafunda, J.K., 2012. Anthropometric characteristics and nutritional status of older adults in the Lake Victoria Basin of East Africa: region, sex, and age differences. *South Afr. J. Clin. Nutr.* 25, 67–72.
- Chilima, D., 2000. Assessing nutritional status and functional ability of older adults in developing countries. *Dev. Pr.* 10, 108–113.
- Dawson-Hughes, B., Harris, S.S., Krall, E.A., Dallal, G.E., 1997. Effect of calcium and vitamin D supplementation on bone density in men and women 65 years of age or older. *N. Engl. J. Med.* 337, 670–676.
- Dorsch, K.D., Bell, A., 2005. Dietary supplement use in adolescents. *Curr. Opin. Pediatr.* 17, 653–657.
- Edington, J., Barnes, R., Bryan, F., Dupree, E., Frost, G., Hickson, M., Lancaster, J., Mongia, S., Smith, J., Torrance, A., 2004. A prospective randomised controlled trial of nutritional supplementation in malnourished elderly in the community: clinical and health economic outcomes. *Clin. Nutr. Edinb. Scotl.* 23, 195.
- El-Kadiki, A., Sutton, A.J., 2005. Role of multivitamins and mineral supplements in preventing infections in elderly people: systematic review and meta-analysis of randomised controlled trials. *BMJ* 330, 871.
- Elmadfa, I., Meyer, A.L., 2008. Body composition, changing physiological functions and nutrient requirements of the elderly. *Ann. Nutr. Metab.* 52, 2–5.
- Elmadfa, Ibrahim, Meyer, A.L., 2008. Body composition, changing physiological functions and nutrient requirements of the elderly. *Ann. Nutr. Metab.* 52, 2–5.
- Ervin, R.B., Kennedy-Stephenson, J., 2002. Mineral intakes of elderly adult supplement and non-supplement users in the third national health and nutrition examination survey. *J. Nutr.* 132, 3422–3427.
- Foote, J.A., Murphy, S.P., Wilkens, L.R., Hankin, J.H., Henderson, B.E., Kolonel, L.N., 2003. Factors Associated with Dietary Supplement Use among Healthy Adults of Five Ethnicities The Multiethnic Cohort Study. *Am. J. Epidemiol.* 157, 888–897.



- Gardiner, P., Woods, C., Kemper, K.J., 2006. Dietary supplement use among health care professionals enrolled in an online curriculum on herbs and dietary supplements. *BMC Complement. Altern. Med.* 6, 21.
- Jagger, C., Matthews, R., Lindesay, J., Robinson, T., Croft, P., Brayne, C., 2009. The effect of dementia trends and treatments on longevity and disability: a simulation model based on the MRC Cognitive Function and Ageing Study (MRC CFAS). *Age and Ageing* 38, 319–325.
- Jasti, S., Siega-Riz, A.M., Bentley, M.E., 2003. Dietary supplement use in the context of health disparities: cultural, ethnic and demographic determinants of use. *J. Nutr.* 133, 2010S–2013S.
- Kennedy, J., 2005. Herb and supplement use in the US adult population. *Clin. Ther.* 27, 1847.
- Kinsella, K.G., Velkoff, V.A., 2001. *An aging world: 2001*. Government Printing Office.
- Kirsh, V., Hayes, R., Mayne, S., Chatterjee, N., Surbar, A.F., Dixon, B., Albanes, D., Andriole, G.L., Urban, D.A., Peters, U., 2006. Supplemental and Dietary Vitamin E,  $\beta$ -Carotene, and Vitamin C Intakes and Prostate Cancer Risk - Google Scholar. *Journal of the National Cancer Institute*, 98.
- Kristal, A.R., Stanford, J.L., Cohen, J.H., Wicklund, K., Patterson, R.E., 1999. Vitamin and mineral supplement use is associated with reduced risk of prostate cancer. *Cancer Epidemiol. Biomarkers Prev.* 8, 887–892.
- Lin, J., Cook, N.R., Albert, C., Zaharris, E., Gaziano, J.M., Van Denburgh, M., Buring, J.E., Manson, J.A.E., 2009. Vitamins C and E and beta carotene supplementation and cancer risk: a randomized controlled trial. *J. Natl. Cancer Inst.* 101, 14–23.
- Manders, M., 2006. *Nutritional care in old age: the effect of supplementation on nutritional status and performance*. Wageningen Universiteit.
- Mba, C.J., 2010. *Population ageing in Ghana: research gaps and the way forward*. J. Aging Res. 2010.
- Murphy, S.P., White, K.K., Park, S.Y., Sharma, S., 2007. Multivitamin-multimineral supplements' effect on total nutrient intake. *Am. J. Clin. Nutr.* 85, 280S–284S.
- Naidoo, N., Abdullah, S., Bawah, A., Binka, F., Chuc, N.T.K., Debpuur, C., Ezeh, A., Gomez-Olive, F.X., Hakimi, M., Van Minh, H., 2010. Ageing and adult health status in eight lower-income countries: the INDEPTH WHO-SAGE collaboration. *Glob. Heal. Action* 11.
- Ness, J., Johnson, D., Nisly, N., 2003. “Polyherbacy”: Herbal Supplements as a Form of Polypharmacy in Older Adults. *J. Gerontol. A. Biol. Sci. Med. Sci.* 58, M478–M478.
- Nisly, N.L., Gryzlak, B.M., Zimmerman, M.B., Wallace, R.B., 2010. Dietary supplement polypharmacy: an unrecognized public health problem? *Evid. Based Complement. Alternat. Med.* 7, 107–113.
- Ortiz-Andrellucchi, A., Sánchez-Villegas, A., Doreste-Alonso, J., de Vries, J., de Groot, L., Serra-Majem, L., 2009. Dietary assessment methods for micronutrient intake in elderly people: a systematic review. *Br J Nutr* 102, 118–149.
- Palmer, M.E., Haller, C., McKinney, P.E., Klein-Schwartz, W., Tschirgi, A., Smolinske, S.C., Woolf, A., Sprague, B.M., Ko, R., Everson, G., 2003. Adverse events associated with dietary supplements: an observational study. *The Lancet* 361, 101–106.

- Payette, H., Gray-Donald, K., 1991. Dietary intake and biochemical indices of nutritional status in an elderly population, with estimates of the precision of the 7-d food record. *Am. J. Clin. Nutr.* 54, 478–488.
- Radimer, K., Bindewald, B., Hughes, J., Ervin, B., Swanson, C., Picciano, M.F., 2004. Dietary supplement use by US adults: data from the National Health and Nutrition Examination Survey, 1999–2000. *Am. J. Epidemiol.* 160, 339–349.
- Radimer, Kathy, Bindewald, B., Hughes, J., Ervin, B., Swanson, C., Picciano, M.F., 2004. Dietary supplement use by US adults: data from the National Health and Nutrition Examination Survey, 1999–2000. *Am. J. Epidemiol.* 160, 339–349.
- Rock, C.L., 2007. Multivitamin-multimineral supplements: who uses them? *Am. J. Clin. Nutr.* 85, 277S–279S.
- Sebastian, R.S., Cleveland, L.E., Goldman, J.D., Moshfegh, A.J., 2007. Older adults who use vitamin/mineral supplements differ from nonusers in nutrient intake adequacy and dietary attitudes. *J. Am. Diet. Assoc.* 107, 1322–1332.
- Sharkey, J.R., Locher, J., Sahyoun, N., Wilcox, S., 2012. Nutrition and Aging: Nutritional Health Inequity [WWW Document]. URL <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3479997/> (accessed 1.7.13).
- Steiner-Asied, M., Mombo Pelenah, J., Bediako-Amoa, B., Danquah, A., 2010. The Nutrition Situation of the Elderly in Ghana: A Case Study. *Asian Journal of Medical Sciences* 2, 95–103.
- Tsui, B., Dennehy, C.E., Tsourounis, C., 2001. A survey of dietary supplement use during pregnancy at an academic medical center. *Am. J. Obstet. Gynecol.* 185, 433–437.
- Tunstall-Pedoe, H., 2006. Preventing Chronic Diseases. A Vital Investment: WHO Global Report. Geneva: World Health Organization, 2005. pp 200. CHF 30.00. ISBN 92 4 1563001. Also published on [http://www.who.int/chp/chronic\\_disease\\_report/en](http://www.who.int/chp/chronic_disease_report/en). *Int. J. Epidemiol.* 35, 1107–1107.
- U.S FDA, 1994. Significant Amendments to the FD&C Act > Dietary Supplement Health and Education Act of 1994 [WWW Document]. URL <http://www.fda.gov/RegulatoryInformation/Legislation/FederalFoodDrugandCosmeticActFDCAct/SignificantAmendmentsstotheFDCAct/ucm148003.htm#sec3> (accessed 7.5.13).
- Vitolins, M.Z., Quandt, S.A., Case, L.D., Bell, R.A., Arcury, T.A., McDonald, J., 2000. Vitamin and mineral supplement use by older rural adults. *J. Gerontol. A. Biol. Sci. Med. Sci.* 55, M613–M617.
- Webb, A.D., 2009. Dietary Supplement Use and Beliefs among College Students Enrolled in an Introductory Nutrition Course. Masters Theses 67.
- Wiygul, J.B., Evans, B.R., Peterson, B.L., Polascik, T.J., Walther, P.J., Robertson, C.N., Albala, D.M., Demark-Wahnefried, W., 2005. Supplement use among men with prostate cancer. *Urology* 66, 161–166.

**APPENDIX I**

SCHOOL OF PUBLIC HEALTH, COLLEGE OF HEALTH SCIENCES,

UNIVERSITY OF GHANA

**QUESTIONNAIRE ON DIETARY SUPPLEMENT USE AND DETERMINANTS  
AMONG THE ELDERLY IN THE KETA MUNICIPAL AREA**

1. Date .....

2. Interviewer's ID.....

3. Respondent's ID .....

**Socio- Demographic Characteristics**

#No	Questions	response	skip	code
4	Indicate sex of respondent	1. Male 2. Female		
5	Age (completed years)	.....		
6	Date of Birth	.../.../..... (dd/mm/yyyy)		
7	Current place of residence	_____		
8	Level of highest education completed	1. None 2. Primary 3. JHS/Middle 4. SHS/O/A level 5. Post-Secondary 6. Tertiary 66. Other Specify_____		
9	Current occupation?	1. Unemployed 2. Retired 3. Civil servant 4. Self-employed (farmer, trader etc.) 66. Other (specify)		
10	Current source of Income (tick all that is applicable)	1. Salary/ wage 2. Stipend/pension 3. Remittance 4. Other(specify)		
11	Amount/ month	.....		

		.....		
<b>Perceived / Reported Health Status:</b>				
<b>Read each of the following statements and ask whether respondent agrees or disagrees with each statement.</b>				
12	According the doctors or nurses you've seen, your health is now excellent	1. Disagree 2. Agree 3. Neither agree nor disagree		
13	You seem to get sick a little easier than other people of your age	1. Disagree 2. Agree 3. Neither agree nor disagree		
14	You worry about your health	1. Disagree 2. Agree 3. Neither agree nor disagree		
15	Your health is excellent	1. Disagree 2. Agree 3. Neither agree nor disagree		
16	You feel about as good now as you ever have	1. Disagree 2. Agree 3. Neither agree nor disagree		
17	Have you ever been diagnosed with any of the following within the last 10 years?	1. Diabetes Yes / No 2. Hypertension Yes / No 3. Stroke Yes / No 4. Arthritis Yes / No 5. Joint pain Yes / No 6. swollen joints Yes / No 7. back pain Yes / No 8. insomnia Yes / No 66. other(specify) Yes / No _____		
18	Are you taking any medications?	1. Yes 2. No	If Yes then ask question 19	
19	In the past 30 days, did you use/take/drink any dietary/ herbal Supplement (pill, tablet, syrup, potion, gel, etc)?	1. Yes 2. No	If no end the interview	
20	Are you aware of any side effects of the supplements you take?	1. Yes 2. No	If Nes ask Q.21 if No skip to Q22	
21	What side effect do you experience?			



**Can you please show me the container(s) or give me the exact name(s) of the dietary supplement(s)? Indicate response code for each of the following questions.**

**If dosage is on label, record recommended dosage (do this part after person has told you how he/she uses it. (Do so for all supplements used)**

22	Name of supplement	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
23	Type 1.Factory processed 2. locally prepared					
24	Manufacturing 1.Ghana 2. Imported					
25	Basis for use 1. prescribed by health worker 2. prescribed by pastor 3. prescribed by herbalist 4. self- prescribed 5. recommended by friend					
26	Provider 1.Hospital/ clinic 2.Pharmacy 3.Private marketer 4.Friend 5.Child abroad/Ghana 6.Herbalist					

	7.Self 66.other(specify)					
27	Frequency of use in past week (#days/week)					
28	Frequency of use in a day (# of times/day)					
29	Purpose/ motivation 1.Maintain/Improve Health 2.Retard ageing / prolong life 3.Reduce stress / fatigue 4.Burn fat/ weight loss 5. For stamina / energy 6. Treatment of Chronic disease 66.Other (specify)					
30	How much do you spend per purchase of supplement dosage?					
31	Manufacturer's label? 1.Yes 2.No					
32	Dosage information on label? 1.Yes 2.No					

## APPENDIX II

**Results from Binary logistic regression**

<b>Variable</b>	<b>OR</b>	<b>95% CI</b>	<b>P-value</b>
Sex	1.18	0.82 - 1.71	0.37
Location	0.58	0.41 - 0.81	0.001*
Highest level of education	1.36	1.19 - 1.55	0.00*
Amount of income /month	1.00	1.001 - 1.004	0.00*
Chronic illness	0.96	0.52 – 1.80	0.91
Perceived health Status	1.05	0.98 – 1.12	0.13

\*p< 0.05 these variable were therefore used in the multiple logistic regression



## APPENDIX III

**List of Supplements****Multivitamins/ minerals**

seven seas jointcare	Emgivit	joint care
durol	Intelectol	CAL-MAG
Dynewell	berocca (B vit)	cebrotonin
eleron	Alvit iron tonic + Bvit	cod liver oil
ferigrow	Rexcofer	wellman
feroclare	Cardiace	X'feron
feroglobin	Cirotamim	zincofer
foliron	ferox cap	Zinoglobin
cordyactive	blood tonic	Rovite
liverstone blood tonic	glucosamin	nexcofer
B-co	Haem up germ	organin
Centrom multivitamin	haematovite	osteocare
Cyprovit	haemoglobin	Proman
Valupak vitamins	haemoglobin	trex-orix Forte
Supavita	haemoglobin B12	vigorix syrup
Letavit		virol

vita ice

vitamin C

Calcium

Foligrow

folic acid

omega 3

Calcium B12 syrup

Citro C

vitamin B

Vit B12

**Herbal/ CAM**

Agbeve Tonic	Vita X
Apeti syrup	Postate
bloman tonic	Bl tonic
Cascalla bitters	Akes
Lamese syrup	Anto tonic
herbal tonic	baobab leaves
herbalife	Rooter mixture
volta tonic	volla fiva mixture
moringa	volta health
noni	jiagang
Ramasa	garlic pills
sokoto Herbal	cordyactive
Power Herbal mixture	TRE-EN-EN
Osompa Tonic	
Eno blood Tonic	
Tonic of life	
Laxo tonic	
Herbatone	

## **APPENDIX IV**

### **Informed Consent Form**

Dietary Supplement Use and Determinants among the Elderly in the Keta Municipal Area

### **Institution affiliation**

Department Of Population, Family and Reproductive Health: School of Public Health, College of Health Sciences, University of Ghana, Legon

### **Background**

Dear participant, my name is Makafui Tamakloe. I am a student from the School of Public Health, University of Ghana. I am conducting a study on the use of Dietary Supplement and determinants among the Elderly in the Keta Municipal Area. The purpose of this study is to determine the pattern of dietary supplement use and determinants among the elderly in Keta municipality, Volta region. This study would be conducted from May to July 2013 and study participants would include both male and female elderly (65 years and above) living in the keta municipal area.

### **Procedure**

Study participants will be asked to answer questions from a questionnaire about their use of dietary supplements and associated factors. This will take about 15 minutes. Your participation in this study will be appreciated. This is purely an academic research which forms part of my work for the award of a Master's degree.

### **Risks and Benefits**

The procedure will not cause any discomfort to participants. The results of the study will provide evidence and guidelines for future nutrition interventions for the elderly.

### **Compensation/ Payment**

There are no incentives/ payment for participating in this study.

### **Right to refuse**

Participation in this study is voluntary and you can choose not to answer any individual question or all questions. You are at liberty to withdraw from the study at any time. However, I will encourage your full participation since your response is important.

### **Anonymity and confidentiality**

I would like to assure you that whatever information you will provide will be taken in strict confidence and will be used purely for research purposes. Your responses will not be shared with anybody who is not part of the study team.

If you have questions you may contact

The Principal Investigator; Makafui Tamakloe on 0240113503 OR

The Administrator, Ghana Health Services Ethical Review Committee

Miss Nana Abena Kwaa Addai-Donkor on 0244712919

## Consent

I ....., declare that I have read the foregoing information, or it has been read to me. The purpose, procedures risks and benefits of the study have been thoroughly explained to me and I have understood. I have also had the opportunity to ask questions about it and any question I have asked have been answered to my satisfaction. I consent voluntarily to participate as a subject in this study and understand that I have the right to withdraw from the study at any time.

I hereby agree to answer the questionnaire

Signature of participant.....Date ...../...../.....

If the respondent cannot read the form themselves a witness must sign here:

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

Signature of witness.....Date...../...../.....

Interviewer's statement:

I, the undersigned, have explained this consent form to the respondent and he/she understands the purpose and procedures to be followed as well as the risks and benefits involved. The respondent has freely agreed to participate in the study.

Signature of interviewer.....Date...../...../.....

