FOOD CONSUMPTION PATTERNS WITH EMPHASIS ON LEGUMES AND LEAFY GREEN VEGETABLES IN TWO GHANAIAN VILLAGES

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ABSTRACT

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This study was designed to examine food consumption patterns in two Ghanaian villages, with emphasis on the consumption of legumes and leafy green vegetables.

Daily food consumption was recorded during a three-day food consumption survey which was conducted in sample households of each village. Questionnaires were administered to identify the various legumes and leafy green vegetables consumed, the frequency of consumption and to investigate factors such as availability, storage and handling, and attitudes associated with the preparation and consumption of legumes and leafy green vegetables.

The results of this study showed that a considerable number of legumes and leafy green vegetables were reported to be consumed in each village, but that relatively few of these same foods were actually consumed during the food consumption survey. The majority of these legumes and leafy green vegetables were found to be purchased as opposed to being homegrown.

Methods of storage for the legumes and leafy green vegetables were quite variable and in most cases inadequate.

Attitudes toward the legumes and leafy green vegetables were found to be positive. The positive response toward increased production of legumes and leafy green vegetables indicated a possible good co-operation in a nutrition education program.

The diets of children as well as pregnant and lactating women were found to be the same as a typical adult diet.

Intake of protein and calcium at the evening meal was found to be low, according to FAO recommendations for specific groups of people in developing countries.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

INTRODUCTION

The Home Extension Unit of the Ministry of Agriculture, and the Home Science Department of the University of Ghana, as of June 30, 1975, have been co-operating in a rural extension project. The purpose of this joint project is to develop approaches which would help raise the standard of living of the rural families of Ghana. This is to be accomplished in part through a practical demonstration of improved methods of managing farm and home resources.

Several Ghanaian villages have been selected to take part in the initial stage of this venture. In each of these villages, a model housing unit will be built using materials which are locally available. The houses will be constructed with the assistance of voluntary labour from the villages and will include a living area, a fenced vegetable garden, a fenced livestock yard and a drying and/or food processing unit. For demonstration of management techniques, each home will include work simplification structures and devices, storage structures and water storage devices. Facilities which will promote home food production, processing and preservation, and good sanitation practices will also be included.

Following completion of the housing units, extension personnel will be able to conduct village demonstrations at the unit on a regular basis, as well as carrying out research related to basic problems of the rural Ghanaian home.

The Home Science Department of the University of Ghana has agreed to support the above mentioned project of the Home Extension Unit through

research activities and training programs. A workshop/laboratory has been constructed on the University campus, as a centre for developing and testing labour saving devices and management approaches. Experiments related to food crops and small domestic animals and the use of more nutritious foods will also be carried out at the workshop/laboratory. The Home Science Department, being on the university campus, has the advantage of drawing on expertise from such university departments as Crop Science, Agricultural Engineering and Extension Education.

The following study was set up to provide information for the above project. The purpose of the study was to conduct household food consumption surveys in two of the Ghanaian villages selected for the project. The data collected will be made available to the Home Science Department of the University of Ghana and the Home Extension Unit for use in the planning and implementation of programs related to improving food for the villagers.

The study also served as a means of assisting the Home Science Department in conducting research in collaboration with the Home Extension Unit.

The general objective of the study was to assess food consumption, at the household level, in relation to its nutrient profile in the two selected Ghanaian villages. Specific objectives included: 1) the identification of the various legumes and vegetables with emphasis on the leafy green vegetables, grown in two selected Ghanaian villages, 2) an enumeration of the frequency of consumption of each of these legumes and leafy green vegetables in the diet of the Ghanaians selected for the study, 3) the recording of such factors as availability, storage

and handling, attitudes and beliefs, associated with the preparation and consumption of legumes and leafy green vegetables in the diet of those participating in the survey.

REVIEW OF LITERATURE

Household Food Consumption Surveys

Raising the level of nutrition of large numbers of people in the developing world is the main objective of numerous nutrition oriented organizations today. Gathering information on people's dietary patterns, food habits and food consumption is a necessary starting point for the improvement of the nutrition of these people. Several methods contribute substantially to knowledge of food consumption, the two most common being food balance sheets and household food consumption surveys.

In developed countries where food production and trade statistics are reliable, assessment of these patterns may be obtained by analyzing food balance sheets. These sheets, in spite of providing useful information on the food supplies available, are not specific enough for appraising the adequacy of food supplies within a particular geographic area or at the individual household level (Schulte et al, 1973).

Household food consumption surveys have the advantage of providing information on daily food consumption of specific groups identified for the survey. To properly assess the results of a nutritional survey and to find ways of solving the nutritional problems in a particular area, Cowan et al (1964) observed that it was very important to gain specific knowledge about dietary patterns, food habits and food consumption of the people in that area. Thus, local surveys are necessary to identify the existing problems in a particular area of the country and to provide information that may assist in the solution of these problems. In cases where nutritional deficiencies have already

been found, Aylward and Jul (1975) stated that food consumption surveys can often be used to determine the most appropriate course to follow in attempting to modify food patterns and to alleviate the situation.

Inano et al (1972) stated that no method for conducting dietary surveys is free from errors that are common to all research conducted with human subjects. Marr (1971) reported that it is seldom possible to give clear cut and confident advice to those wishing to do a dietary survey. Périssé (1976) was in full agreement, stating that no standardized method for the collection of food consumption data has been established. Therefore, a method must be selected by each researcher, taking into consideration such factors as the purpose of the study, the size of the sample, the characteristics of the people to be studied, the availability of funds, time and personnel. The objective of the dietary survey must be clearly defined, since it is the objective which determines the most appropriate method to be employed in collecting, processing and interpreting the data. Thus it might be said that the choice of method is usually a compromise between various factors; the relative importance of which must be evaluated for each study in view of local conditions. When conducting a food consumption survey in a developing country, it is necessary to consider such factors as the educational level of the survey participants and the economic conditions, as well as the local food habits and patterns.

Pekkarinen (1970) suggested three methods for the collection of food consumption data, the three being the food account method, the weighing method, and the interview. In the food account method,

amounts of foods consumed, as well as daily food purchases, are recorded in detail over a specified time period. The food account method is effective for surveying families but not for surveying individuals, since it only provides information on total consumption of the family and not on distribution of food among family members. Trulson et al (1959) suggested that this type of survey would require the use of literate respondents in order that they might record all of their foods consumed and purchased. According to FAO (1964), the food account method is sometimes inaccurate because not all households can estimate quantities in standard units and therefore require conversion factors which are often approximate. As recorded by Marr (1971), errors in estimation of portion size are probably the largest source of error in the food account method.

The second method for the collection of food consumption data requires that all foods be weighed daily during the survey period. Marr (1971) reported that each food ingredient, as well as the finished product, should be weighed. Thus the use of this method would be limited to a small sample since it is very time-consuming and consequently very costly to conduct. However, in a developing country this cost would be greatly reduced since a limited number of foods are used. A disadvantage of the weighing method might occur if the weighing procedure becomes too time-consuming, in which case families may tend to prepare simpler meals. Pekkarinen (1970) stated that it is an advantage if a field worker can be employed to do the weighing; this would be necessary in a developing country if the group of people being surveyed were illiterate. However, when outside investigators are employed for weighing the food, there is an immediate increase in cost of the survey and this in turn usually

limits the sample size. A rural setting in a developing country would dictate the use of very simple weighing techniques because of limited facilities available. As stated by Reh (1962), the simplest method of weighing is to weigh the empty container and then to subtract this weight from the weight of cooked food and container.

The third method is interchangeably known as the interview, questionnaire, or diet recall method, and is most efficient when the sample is large (Pekkarinen, 1970). This particular method is quite likely to have some degree of error since amounts of food consumed by the survey participants are usually recorded as household measures, and these are not normally standardized. The interview method often records frequencies of foods consumed and this can then be used as a cross-check of actual consumption as determined by the weighing method (Youland and Engle, 1976). The interview method is considered to be the easiest of the three, and usually receives a better response than the other two methods. However, the participants of the survey may experience a memory lapse which would alter the results. There is also some possibility that the survey participants may exaggerate when recalling their food consumption, in order that their food intake may appear better to the interviewer (FAO, 1964).

Pekkarinen (1970) stated that there is no perfect method for the collection of food consumption data. Advantages and disadvantages of the three methods have been given, but most investigators agree that the most reliable food consumption data is collected by the weighing method (Marr, 1971; Harris, 1962; Pekkarinen, 1970; Trulson et al, 1959; Hunscher and Macy, 1951). FAO (1964) suggested that each of these tech-

niques can be used alone but that in practice, various combinations are often adopted in order to meet all the needs of a survey.

Questionnaires, when employed, should be pretested prior to conducting the survey. Young (1959) and Sellitz et al (1963) agree that conducting a pretest of the questionnaire is valuable in that it identifies areas open to misinterpretation, embarrassment, boredom and impatience in the respondent, and therefore indicates areas of concern which may require reworking before the actual survey is conducted. Pretesting a questionnaire for clarity is especially important when interviewers are employed to administer the questionnaire, to ensure that the interviewers have interpreted the questionnaire correctly and that they question the participants in the same manner. These interviewers should be carefully selected and trained in order that they present themselves in a relaxed manner with a quiet, unhurried willingness to listen, without showing a reaction to any of the circumstances or statements that the respondents may make. Norris (1949) believes that the interviewers should preferably be people who are aware of local foods as well as cooking and eating practices in the survey area. The interviewers should speak the language and should be readily accepted by the survey participants, thus receiving more co-operation than a stranger to the area.

A food consumption survey must continue for a sufficient length of time to enable "customary" intake to be assessed. The length of the survey depends on the purpose and the conditions of the study (Marr, 1971). However, three to seven days is usual for the collection of food consumption data.

Pekkarinen (1970) stated that in countries where the variety of foods is very limited, as little as a one-day survey may be enough. Flores et al (1964) found that a three-day survey was sufficient for preschool children in a Guatemalan Indian community. Edwards and Dodds (1965) conducted a five-day survey on school children in Ghana and found that the time period was sufficient since the diets varied little and consisted mainly of the staple foods. Adelson (1960) observed that the results from a one-week survey were as satisfactory as results from a two-week survey, thus eliminating the need to continue a food consumption survey for longer than seven days.

The question of survey time length has been concisely summarized by Norris (1949) when she stated that in Western countries, seven days has come to be regarded as the appropriate minimum time period for a dietary survey, whereas in developing countries the survey time period may be shorter according to local customs and conditions. Diets in developing countries do not often vary much from day to day since one or two staple foods make up the majority of the diet.

FAO (1964) recommended that food consumption surveys in developing countries be conducted during the different seasons if possible, since seasonal variations in food consumption can be very great. Therefore a shorter survey period would be adequate.

In order to determine the causes of dietary deficiencies, it is necessary to know the nutrient composition of available foods and food products. This information may be used to develop nutritional programs which will aid in the elimination of these problems. In food consumption surveys, the adequacy of the diet is assessed by comparing the

nutritive value of the food consumed during the survey with the nutritional requirements of the survey participants (Reh, 1962).

There are several methods that can be used to assess the nutritive value of foods. Donelson and Leichsenring (1942) found that foods could be placed into separate groups such as cereals, fats, etc., and then analyzed for food value. This method was shown to be highly satisfactory when applied to weekly dietary records, but could also be used to approximate the nutritive value of diets for which only one day's food records were taken. However, most researchers have found it best to analyze each food separately as to nutrient content, and combine the individual figures to obtain the day's nutrient intake.

A less expensive method of determining nutritive value is by the use of food composition tables. Marr (1971) quoted Harris (1962) as saying that while food tables do not present data with an accuracy of atomic weight determination, neither are they so unreliable as to be worthless. Food composition tables are a very convenient means of calculating the nutritive value of household food supplies. One of the disadvantages of using food tables is that they do not list certain substances, such as oxalic acid, which interfere with nutrient absorption. However, Marr (1971) reported that several studies have been conducted, comparing the nutrient values obtained by calculation from tables of food consumption to those obtained by chemical analysis, and a significant difference was not found. He stated therefore that food tables are adequate for calculation of nutrients but that they should be up to date and should include data for all the foods that are eaten. Whenever available, national food composition tables should be used since they

are likely to give the most appropriate values of the foods to be found in the country being surveyed (FAO, 1964). Watson (1971) made some investigations on the nutritive value of some Ghanaian foodstuffs to be used in a food composition table manual for use within that country. He stated that if nutrient composition of foods eaten within a particular country are not known, then an assessment must be made using international food composition tables from which values for nutrients in foods are in many cases unsatisfactory.

After nutrient intakes have been calculated, they can be compared to recommended dietary allowances. For a family or a household, the nutrients consumed by all members can be added together and then divided by the number of household members to obtain a per caput figure. This figure can then be compared to the average national recommended allowance per caput (Norris, 1949).

Hunscher and Macy (1951) warned that dietary intake should not be confused with nutritional status because determination of this status requires knowledge of the condition of the persons consuming the food. Estimates of caloric and nutrient intake only are not sufficient for an accurate evaluation of nutritional status (Beaten, 1966). Inequalities in distribution of food and the availability of nutrients within a food are just two of a variety of factors that may influence the situation. However, an estimation of dietary intake is essential in any interpretation of measurements of nutritional status.

Voris (1968) quoted the Food and Nutrition Board of the United States as stating that if recommended allowances are used as reference

standards for interpreting records of food consumption, it should not be assumed that food practices are necessarily poor or that malnutrition exists because the recommendations are not completely met. The researcher must go further and examine the total health status of the individual. The nutritional status of population groups is reflective of dietary patterns followed over extended periods of time, and therefore short term food consumption surveys must be interpreted judiciously.

The nutritional value of food consumed is revealed partially by analysis of the survey data, but in order to bring about any improvement in diet, one must also consider cultural, social and economic characteristics of the population concerned. The potential for agricultural development in the area will be a factor in determining the choice of foods used to improve their diet. Therefore, results of a food consumption survey and their implications should be discussed with local leaders and residents in an attempt to obtain their help and suggestions in planning desirable changes as determined from results of the survey (Reh, 1962).

People participating in a food consumption survey expect to see practical results of the survey and therefore, in order to have a successful program, it is essential that results be applied as quickly as possible (Norris, 1949).

Food Problems in Ghana

Various nutritional surveys have shown that dietary deficiencies do exist in Ghana (Aylward, 1966; Lwiro, 1959; den Hartog, 1972; Sai,

1972). Accra, the capital city of Ghana, is one of many African cities which has been stricken in recent years with food shortages related to drought, inflation and reduced value of worker's incomes (Williams, 1974). The rural areas of Ghana are also experiencing the effects of inflation as exemplified by changes in their food consumption (Steckle, 1975).

May (1965) described hunger in Ghana as being of two types:
1) a rural form of hunger between the times when food stocks are exhausted and the next harvest comes in, and
2) an urban form of hunger caused by the gap between the cost of food and financial resources.

In most rural areas of Ghana, subsistence agriculture is the way of life, with families or communities self-contained, using and processing their own agricultural produce with a certain amount of bartering and cash transaction (Aylward, 1966). As mentioned, when negative factors such as poor weather conditions or inflation set in, as has been prevalent in Ghana, subsistence farming suffers, usually resulting in food shortages. Apart from these food or calorie shortages, protein deficiency diseases must be regarded as the major cause of malnutrition in most low-income countries (Aylward and Jul, 1975). Proteins are required in considerable amounts each day, and deficiencies cannot be dealt with through provision of medicines. Permanent solutions such as food supplementation or changes in food patterns and habits must evolve. Mayer (1959) reported that malnutrition is widespread throughout Ghana, and that chronic protein deficiency is the outstanding type of malnutrition. As Ababio (1974) reported, Ghana has an important "protein gap"

which must be filled. Because of the high degree of dependence upon starchy staples, the nutrient composition of local diets is often a reflection of the staple foods (Annegers, 1973). The staple foods of a large percentage of the Ghanaian people are starchy roots such as cassava. Mayer (1959) stated that animal protein is very rare in the diet for several reasons. Fish is popular along the coast, but due to lack of refrigeration facilities and to transportation problems, the consumption of fish decreases considerably in inland areas. Meat and milk are very expensive in Ghana because of the tsetse fly disease which affects most of the cattle, thus lowering production. The Muslim section of the population does not eat pork. Egg production in Ghana is relatively low. The eggs which are produced are very expensive so are often sold to higher wage earners or expatriates who can afford them. The consumption of bush meat and snails is declining but these foods are still fairly popular among the Ghanaians. The consumed proteins are mostly of vegetable origin (May, 1965) such as roots and grains and occasionally pulses such as dry beans and peas. The consumption of these relatively protein rich foods is now being promoted in Ghana by the Ministry of Agriculture.

A major problem relating to food consumption in Ghana is that of the unequal distribution of food. Distribution is unequal not only in different regions of the country and between different socio-economic groups, but also within the same household (den Hartog, 1972). Men are often given first choice of food and consequently the more vulnerable groups such as children or pregnant and lactating mothers, suffer. As stated by May (1965), the father's needs are satisfied first and then

those of the other male family members in order of their production potential. Small children are very often denied even small amounts of the protein foods such as eggs and fish consumed by adult males, so that after weaning, the children's protein intake is extremely low (Mayer, 1959).

Results of the National Nutrition Survey of Ghana revealed that food distribution in the Ghanaian family was unequal (den Hartog, 1972). It appeared that adults, both male and female, received between eighty and over one hundred percent of their energy requirements, whereas children received between fifty-five and seventy percent of theirs. In some regions of Ghana, some of the very young children lacked fifty percent of their energy requirements.

In order to adequately feed all Ghanaians, more of the essential nutrients from various food sources must be produced than are now available on the market. These nutrients must also be produced cheaply enough so that the lower income residents can afford them. Food resources in Ghana are inadequate because of climate, soil and low levels of technology. If improvement programs are not carefully thought out, they may worsen the situation, for example by the exploitation of the forest areas (May, 1965).

Aylward (1966) believed that the protein of legumes and oil-seeds represents the greatest potential for a protein food source in Ghana. However, there are many factors to be considered when attempting to introduce a new vegetable protein into the diet of a country. Sai (1960) mentioned some of these factors, including amino acid composition, toxicity, storagability in a tropical climate, ease of preparation, cost,

acceptability, and availability to groups who have the need for it, and education of the population.

May (1965) stated that in normal times, it is expected that considerable malnutrition will continue to exist in Ghana, both in rural areas during the dry season where soil and climate govern the food supply, and also in the cities where serious problems are created by economic and social conditions. These problems therefore are a real challenge and opportunity to nutritionists and others concerned with nutrition. Sai (1960) warns, however, that any remedial action should be based on careful study and a consideration of all possible factors that would bring success or failure to the program. According to Aylward and Jul (1975), most agricultural advisors believe in a diversified approach in low income countries. This would include the use of backyard gardens to improve the food supply.

The Importance of Legumes and Leafy Green Vegetables in the Ghanaian Diet

Legumes

It is well known that most developing countries today are experiencing a protein deficiency (Aylward and Jul, 1975). Animal protein in Ghana is in short supply and is therefore very costly, so it is essential that a cheaper, more readily available form of protein be utilized in order that the people meet the protein intake recommendations as specified by FAO.

Food legumes, the edible seeds of leguminous plants belonging to the Leguminosae family, as a group contain approximately twice as much protein as cereals. The crude protein in most pulses ranges from between twenty and thirty percent (Patwardhan, 1962). This high protein content is in itself greatly significant. However, the contribution made by any protein to the fulfillment of requirements depends not only on the quantity in which it is present, but also on its quality, which in turn depends on its amino acid content (Aykroyd et al, 1964). Once the essential amino acid present in the smallest amount has been utilized, the remaining amino acids are not effective. Legume proteins as a rule are poor sources of the sulfur containing amino acids, methionine and cystine, and many are also somewhat deficient in tryptophan and isoleucine. However, they are comparatively rich in lysine. Most cereal proteins are deficient in lysine but they are rich in sulfur-containing amino acids and therefore cereals and legumes have a definite supplementary relationship which Siegel and Fawcett (1976) described as an almost ideal source of dietary protein for human beings. This combination of cereal and legume proteins is extremely important for developing countries (Stanton, 1966). The supplementary relationship between legumes and cereals is only valid when both are ingested simultaneously. Beans one day and maize the next will not provide the same useful combination of the amino acids required by the human body as beans and maize eaten at the same meal (Aykroyd et al, 1964). Therefore, legumes must be eaten together with the staple if they are to produce a maximum effect in supplementing cereal diets. In order for this legume-cereal nutritional complementarity to be at its optimum, the two foods need to

be eaten in an approximate cereal to legume ratio of sixty-five to thirty-five. At present, in most developing countries, legumes have not yet reached such a high rate of acceptance and therefore the cereal to legume ratio tends to be closer to ninety to ten.

Protein is not the sole nutrient found in legumes. Legumes in general contain about sixty percent carbohydrate (mainly starch) which is usually well absorbed and utilized by the body. The fat content of most legumes ranges between one and two percent, although bambara nuts contain approximately six percent and groundnuts contain in excess of forty-three percent fat.

Legumes are not a rich source of vitamins. Carotene is present in legumes in very limited amounts such as that in the red skin of groundnuts. The thiamin and riboflavin content of legumes are both fairly low. Niacin, however, is found in greater quantities in legumes, especially in groundnuts which contain approximately sixteen milligrams per one hundred grams (Aykroyd et al, 1964). Dried legumes are relatively devoid of ascorbic acid, since any small amounts that may have been present when the legumes were harvested disappear after storage and during the prolonged cooking period to which most legumes are exposed.

Legumes are fairly rich in some minerals. Calcium and iron levels in legumes are relatively high. The absorption and utilization of both calcium and iron from legumes, however, may be affected by the phytic acid which legumes contain. Phytic acid will precipitate insoluble calcium and iron salts in the stomach and duodenum (Doughty, 1966). In spite of this, legumes are still considered to be good sources of calcium and iron, containing about one hundred milligrams per one

hundred grams, and seven milligrams per one hundred grams respectively.

Most legumes create a problem for the consumer in that they contain antinutritional or toxic factors. These toxic factors include trypsin inhibitors, cyanogenetic glucosides, saponins, alkaloids, goitrogenic factors, haemagglutinins, and the unknown factor which produces lathyrism (Leiner, 1962). Fortunately, most toxic effects of legumes can be partially or wholly eliminated by application of heat over a specified time period (Patwardhan, 1962). Heat also enhances the nutritive value of proteins by destroying deleterious factors present in the raw legume, depending on the temperature used and the duration of heating and the moisture conditions (Aykroyd, 1964). Other agents used in the elimination of trypsin inhibitors in legumes are dietary supplementation with either methionine or Vitamine B12.

Since Ghana is a country where malnutrition, particularly protein deficiency, is a major problem, the use of legumes as a cheap protein food source is constantly being stressed in nutrition education programs (Dovlo, 1975). Williams (1974) stated that vegetable proteins such as those obtained from cowpeas, bambara nuts, groundnuts, etc., are inexpensive products which could constitute a very efficient protein supplement. These vegetable sources of protein have a very high protein content and could provide some of the essential amino acids. Doughty (1966) reported that the most widely used legume in Africa is the cowpea (Vigna unguiculata), which Ghanaian people often incorporate into their soups. Ghana produces about 30,500 metric tons of cowpeas annually. However, twenty to thirty percent of this becomes unavailable for human consump-

tion due to insect damage. Thus, considerable quantities of cowpeas would need to be imported in order that Ghanaians may consume forty grams per person per day, as recommended by FAO for Africans south of the Sahara (Kuranchie, 1975). The Food Research Institute in Accra is presently testing and developing cowpea recipes for the people of Ghana, including special recipes for use as weaning foods (Dovlo et al, 1976).

Leafy Green Vegetables

According to Sai (1965), leafy green vegetables, along with other fruits and vegetables, do not have the importance they deserve in the diet of the West African people. Reasons for this include lack of knowledge of their nutritive value, high cost, and difficulty of storage and distribution.

Vegetables in Ghana are commonly used for making soups or stews, but they are rarely, if ever, served as a separate dish. In Southern Ghana at the present time, the most commonly used form of spinach is nkontomire (cocoyam leaves), which Karikari (1971) reported as containing 22.17 grams of protein per one hundred grams dry weight of the leaf. Nkontomire and other leafy green vegetables are all cooked before eating, and are usually cooked too long, thus losing much of their nutritive value (Sai, 1965). The leaves are washed, broken up and boiled until soft (about twenty minutes, but they may be left on the fire for very much longer). They are then mashed and the mashed pulp is put back into the soup or stew (Dako, 1976). Sai (1965) stated that better cooking

methods of green leaves need to be developed in order to improve the nutritive value of the vegetables.

Leafy green vegetables have a very low caloric value. Protein is also limited, but the small amount present is useful in supplementing proteins which may be lacking in the staple food. For example, in Southern Ghana the main staple is cassava, which is extremely low in protein and therefore needs supplementation from a variety of sources. Aylward (1966) reported that cassava based African diets are often supplemented by the gathering of leaves, for example, from the cassava or cocoyam plant.

Carotene content is high in leafy greens and is a source of Vitamin A. Vitamin C content is also fairly high as is the calcium content. A good source of calcium is very important to the Ghanaian diet since milk is often not available (Sai, 1965). Green leafy vegetables are also good sources of iron, thiamin, riboflavin and nicotinic acid.

Unfortunately, many of the above-mentioned nutrients are reduced or destroyed upon cooking (Lang, 1970). Carotene content is not influenced to any great extent when fresh vegetables are cooked because the carotenoids are insoluble in water and resistant to oxidation (Griswold, 1962), but a large proportion of the water-soluble vitamins are lost during cooking. Ascorbic acid is very unstable to heat, air, light, oxidases and certain metallic compounds (Lang, 1970), and therefore ascorbic acid is easily destroyed during the preparation of leafy green vegetables as practised by Ghanaians.

Ghanaian villagers have been encouraged to plant backyard gardens by the Ministry of Agriculture. This was part of a civilian campaign

to relieve some of the strain surrounding food shortages (Steckle, 1975). It has been suggested by Sai (1965) that improvements in the cooking, storage and preservation of legumes and leafy green vegetables are necessary to accompany increased production. The study reported here was undertaken in an attempt to provide data which would contribute information to programs concerned with the improvement of Ghanaian diets through better utilization of legumes and leafy green vegetables.

METHODOLOGY

Selection of Villages

The senior administrators of the Home Extension Unit of the Ministry of Agriculture suggested Oko and Oyibi as two villages where the data for this survey could be collected. The Home Extension Unit in Ghana consists of two senior administrators along with several Senior Technical Officers, Technical Officers and their assistants. The senior administrators occupy an office within the Ministry of Agriculture in Accra, and it is from this office that all the planning for the village extension work is done. The Senior Technical Officers, who had completed a two-year agricultural course, had three years experience in village extension work and had taken a two-year diploma course in Home Science from the University of Ghana, are each responsible for village extension work in a geographic area of Ghana. The Senior Technical Officers assist the senior administrators in the planning stages of their projects, as well as coordinating the work of the Technical Officers. The Technical Officers have completed a two-year agricultural course with some Home Science content and are employed as extension workers responsible for the Home Extension programs. Each works in approximately six villages with a less trained assistant.

Home Extension personnel were instrumental not only in selecting the villages for this study but also in making introductions at the village level and in helping to select the sample.

Oko and Oyibi, Ga speaking villages in the Greater Accra Region, both have active participants in the Home Extension Program. They will

each have access in the near future to a housing unit with a vegetable garden and an animal plot, to be built for demonstration purposes by the Home Extension Unit. It was essential that both villages be in close proximity to the University of Ghana because of the time and transportation limitations imposed upon the survey.

Description of Villages

Oko is a relatively small village of approximately fourteen houses and is situated about eight miles north of Accra. There is a Presbyterian Church in the village, but no shops or schools. The children attend school in Dome, a village just one quarter mile away. Food marketing is also done in Dome at the train station. Each day, excepting Sundays, a train stops in Dome for about five or ten minutes and all the marketing is done through the train windows. Many women do their marketing every morning, buying enough for the day, since it is difficult to store perishable foodstuffs.

Oyibi is a much larger village of approximately eighty houses and is found about twenty miles north of Accra on the Dodowa road. Oyibi has both primary and middle schools and a flour mill, but no shops. Marketing is done either in Accra or in Dodowa which is five miles north of Oyibi. The Dodowa market is held twice a week on Tuesdays and Thursdays.

In both villages there is also a considerable amount of food sold by traders. Several women traders are involved daily in making and selling kenkey. Others buy bread, meat and vegetables in large quantities

from Accra and sell them locally, and still others set up temporary stalls outside their homes to sell vegetables from their farms.

Sampling Within Villages

It was decided, after suggestions from one of the Home Extension administrators, to sample all active participants of the voluntary Home Extension Program in the two villages. These would be the households who would directly benefit from the demonstrations. This is probably a biased sample in terms of getting information about village food consumption since these households generally were the more progressive and had been exposed to more nutrition education than the remaining households. However, these households were expected to give full cooperation.

In Oko, this sampling involved nine households, which represented approximately seventy percent of the total village population. The term household, for the purposes of this study, refers to those persons sharing domestic arrangements for cooking and eating their food. As the survey progressed, one participant from Oko went into a lengthy state of mourning and was not able to be interviewed, thus reducing the number of households actually surveyed to eight.

In Oyibi, sixteen households, all active participants of the Home Extension Program, and representing approximately twenty percent of the total village population, agreed to participate in the survey. Two of these households were chosen for pretesting the questionnaire, and the members of one other household left to attend a funeral and failed to return before the survey was completed, thus reducing the number of households interviewed to thirteen.

The total number of households in the survey were numbered, and so are refered to by number in this study.

Selection of Interviewers

It was originally hoped that the local Technical Officer employed in each of the selected villages would administer the questionnaire since she would be familiar with the language spoken in the village. The Technical Officer would also have the advantage of holding the confidence of the village inhabitants and of being aware of many of their dietary habits. In Oyibi, the Technical Officer was willing to act as the interviewer but Oko's Technical Officer was about to go on leave and therefore it was essential for the study to find a replacement. It was decided to hire a graduate of the Home Science diploma program at Legon, who spoke the language and had had previous experience with the administration of food consumption questionnaires in another village.

Training of Interviewers

The two interviewers were trained together by the author at the University of Ghana, prior to the administration of the questionnaire. The objectives of the study were outlined and discussed so that the interviewers would be prepared to answer any queries about the study that the villagers might have. Basic terms and introductory phrases to be used in the questionnaire were discussed and agreed upon. The order of administering the questionnaire was also established.

Preliminary Work

The Senior Technical Officer for the area in which each selected village was located was instrumental in making introductions to the village chief and getting his approval for the study. After approval was obtained, the Technical Officer made introductions to the villagers and succeeded in gaining their approval for the survey. The author then spent one week in each village, accompanied part time by the Technical Officer, visiting each of the households selected for the study. During these visits, village customs as well as household cooking and eating practices were observed. Several cooking demonstrations such as the making of kenkey, a convenience food normally consumed for breakfast or lunch, were put on for the benefit of the author. Also, specific names of legumes and leafy green vegetables were selected for use in the questionnaire. These names were obtained from several householders as those commonly used in the villages. It was necessary to introduce the interviewer who was to work in the village of Oko to the households during this week. The Technical Officer was instrumental in making the introductions. The interviewers then arranged a convenient time and date for each interview to take place.

The Questionnaire

The purpose of the questionnaire was to gain specific information on the eating patterns and habits of the people in the two selected villages. Emphasis was placed on the legume and leafy green vegetable consumption patterns (Appendix).

The questionnaire was comprised of four main sections:

(a) information on household members

(b) meal patterns and preparation of individual dishes

(c) daily food consumption

(d) attitudes toward specific food items.

The first section was designed to obtain a general description of the sample. It included age, sex, education and occupation of all household members. The second section dealt mainly with the preparation, use (including frequency of use), and storage of specific legumes and leafy green vegetables. The third part of the questionnaire was designed to gain information on all food consumption within the household during the survey period. This information was then used to calculate the nutrient intake of the household members on a per capita basis. The information was also useful in that it was used to compare reported and actual (as measured and observed) frequencies of consumption of certain foods. The fourth section dealt with perceived reasons for consumption or non-consumption of specific legumes and leafy green vegetables. Attitudinal information could be useful when planning a nutrition program which emphasized the growing and consumption of legumes and leafy green vegetables.

Data Collection

The questionnaire was pretested using two households in Oyibi. Two adjacent households were selected so the interviewers could easily check with each other to ensure that they were questioning in the same manner. The interviewers and the author spent three consecutive days

pretesting the questionnaire, with one interviewer in each household. During the pretest, the interviewers found it very difficult to estimate the quantity of foodstuffs without weighing them. Therefore, two standardized food scales were obtained from the Home Science Department at Legon. These scales were used to weigh each food item as well as the final cooked product.

After the pretest was completed, the questionnaire was administered by the interviewers in each village. The author was present on alternate days at each village. Personal observations on food consumption habits in the villages and purchasing habits in the markets were also recorded by the author, for use in supporting the data from the questionnaire. The interviewers recorded additional comments made by the householders that they thought relevant.

The information on household members was collected from the head of the household. This included age, sex, education and occupation of each household member. All other questions were answered by the chief cook. The chief cook was identified as the person with status who was responsible for the food preparation.

The data was obtained during three consecutive days in each household through daily visits of approximately three hours each. The chart for daily food consumption was completed on each of the three days. The decision to limit the survey to three days was made after the one week visit which the author spent in each village. It was observed during this time that the diet in these villages was very limited and repetitious, and therefore additional days for data collection would not likely introduce much variation. The information on household members was collected

on Day One, the meal patterns and preparation of individual dishes were recorded on Day Two, and the attitudes toward specific food items were recorded on Day Three. The twenty-four hour recall method was used to complete the daily food consumption charts for morning and noon meals. The survey was conducted during or immediately following the harvest season in both Oko and Oyibi. This is the time when food-stuffs should be most available.

RESULTS AND DISCUSSION

Description of Sample

Sex and Age Distribution

The total number of people in the sample households in Oyibi was 118, and the total number in Oko was seventy-one.

The sex and age distribution of household members in both Oyibi and Oko (Figures 1 and 2) is of interest since it shows that for the adult population (those over the age of twenty years), the majority of the residents were female. Children remained in the villages as long as they were of-school age but it is evident that males tended to leave the villages from age twenty onwards. In Oko (Figure 2) there were no male household members between the ages of thirty-one and sixty, and in Oyibi (Figure 1), the males of this age group were fewer than half of the females. With both villages being fairly close to the capital city of Accra, many males had left the village for a city job, and returned to the village infrequently. It is also interesting to note from data presented in Figure 2 that Oko had a relatively large number of residents over sixty years of age. Several household members commented on this fact, stressing that the mortality rate in their village was relatively low.

Level of Education

The data presented in Figures 3 and 4 indicate the level of education for both children and adults in each village. Most children enter school at the age of six and are able to attend both primary and middle school in their own village as is the case in Oyibi, or in a neighbouring

FIGURE 1

SEX AND AGE DISTRIBUTION OF HOUSEHOLD MEMBERS IN OYIBI - NOVEMBER 1976

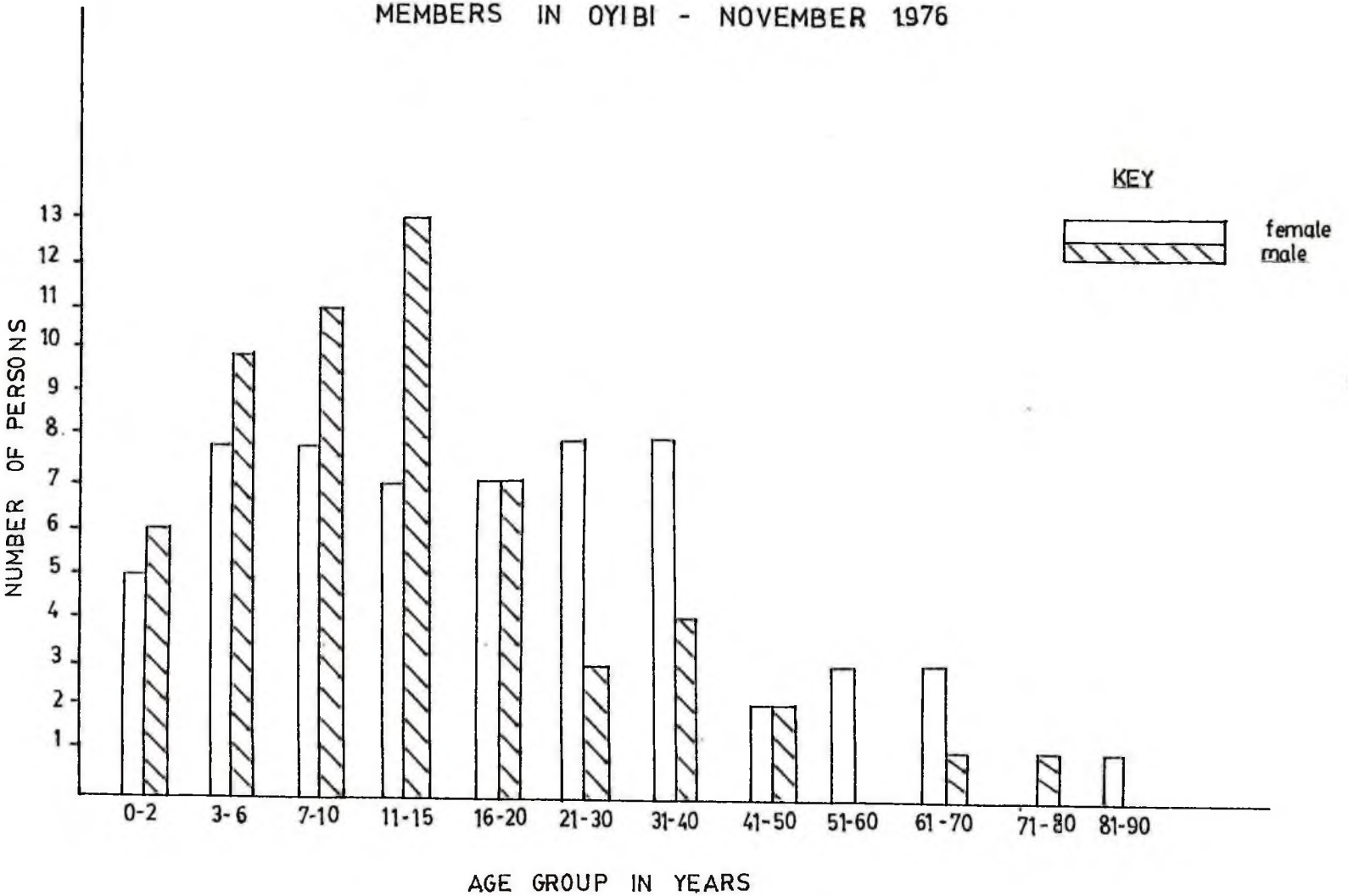


FIGURE 2

SEX AND AGE DISTRIBUTION OF HOUSEHOLD MEMBERS IN OKO - NOVEMBER 1976

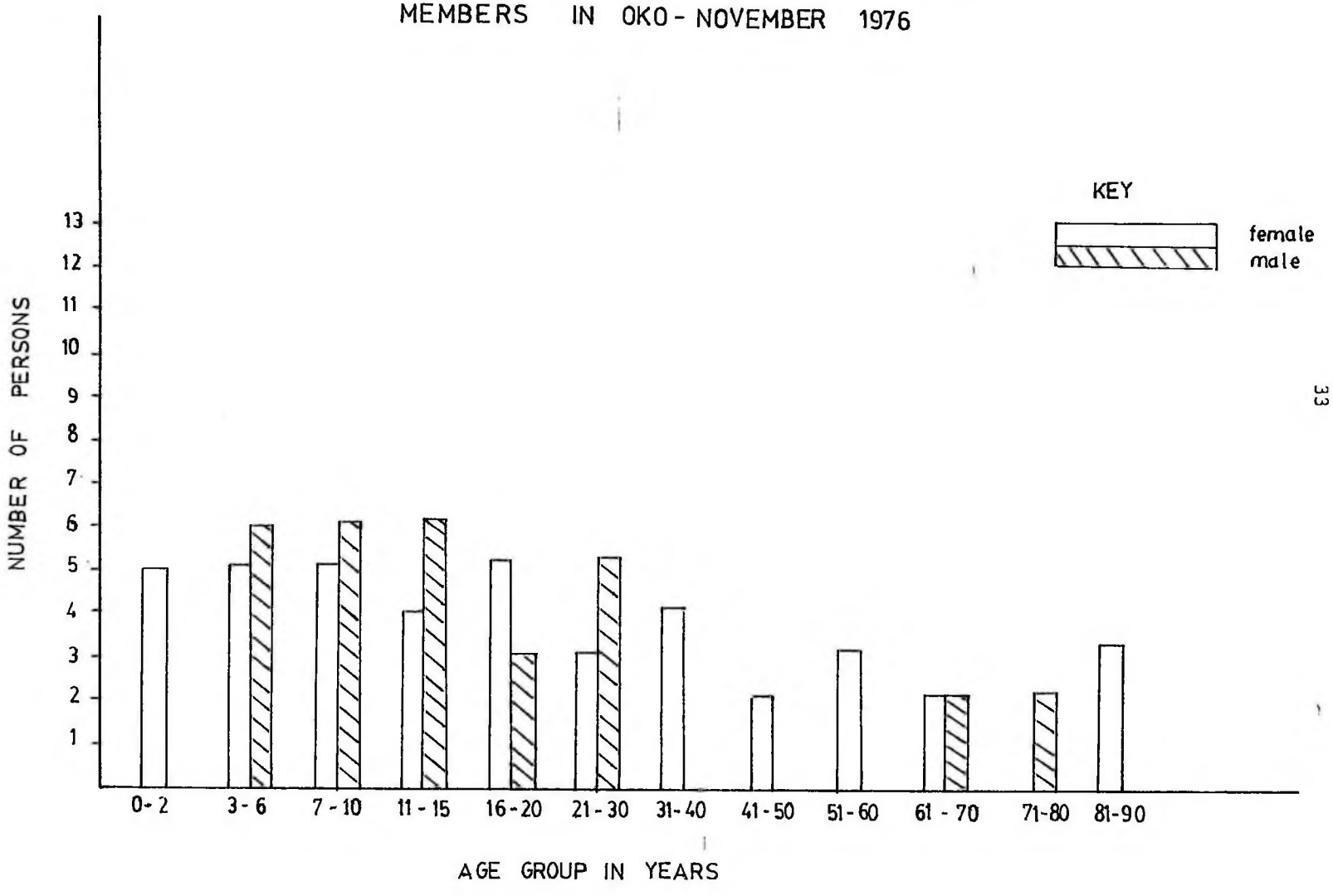


FIGURE 3.

EDUCATION OF HOUSEHOLD MEMBERS IN OYIBI

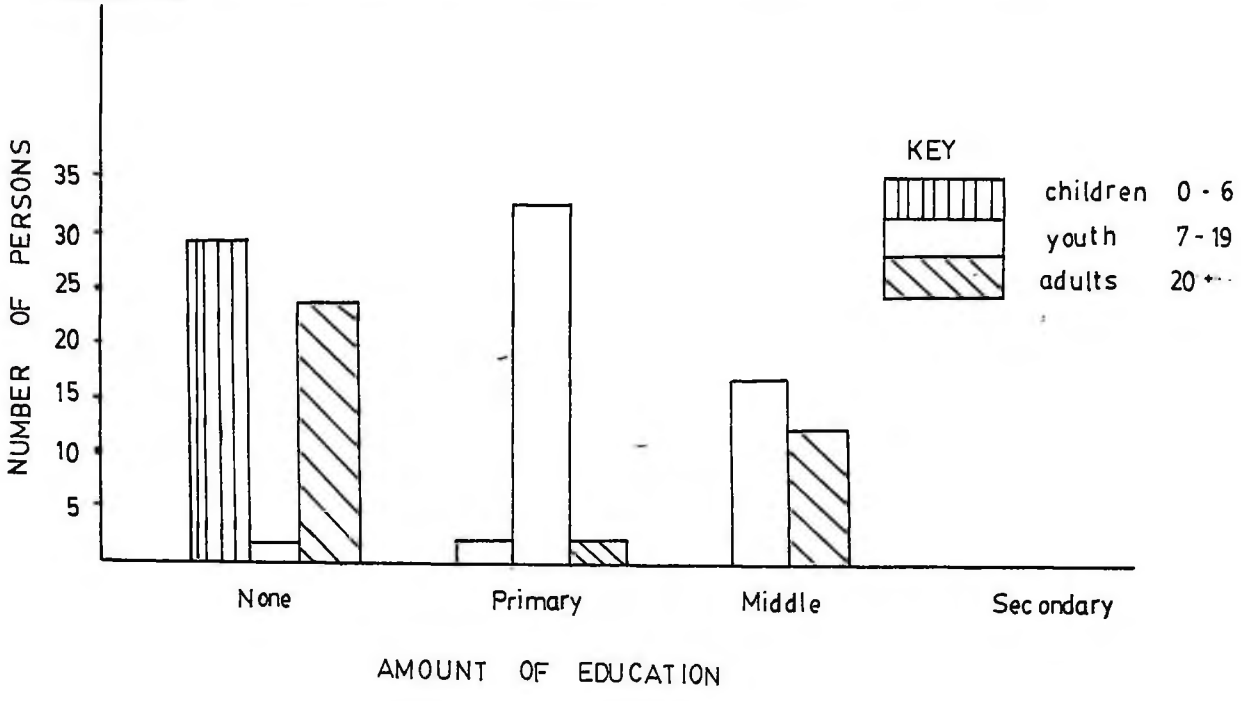
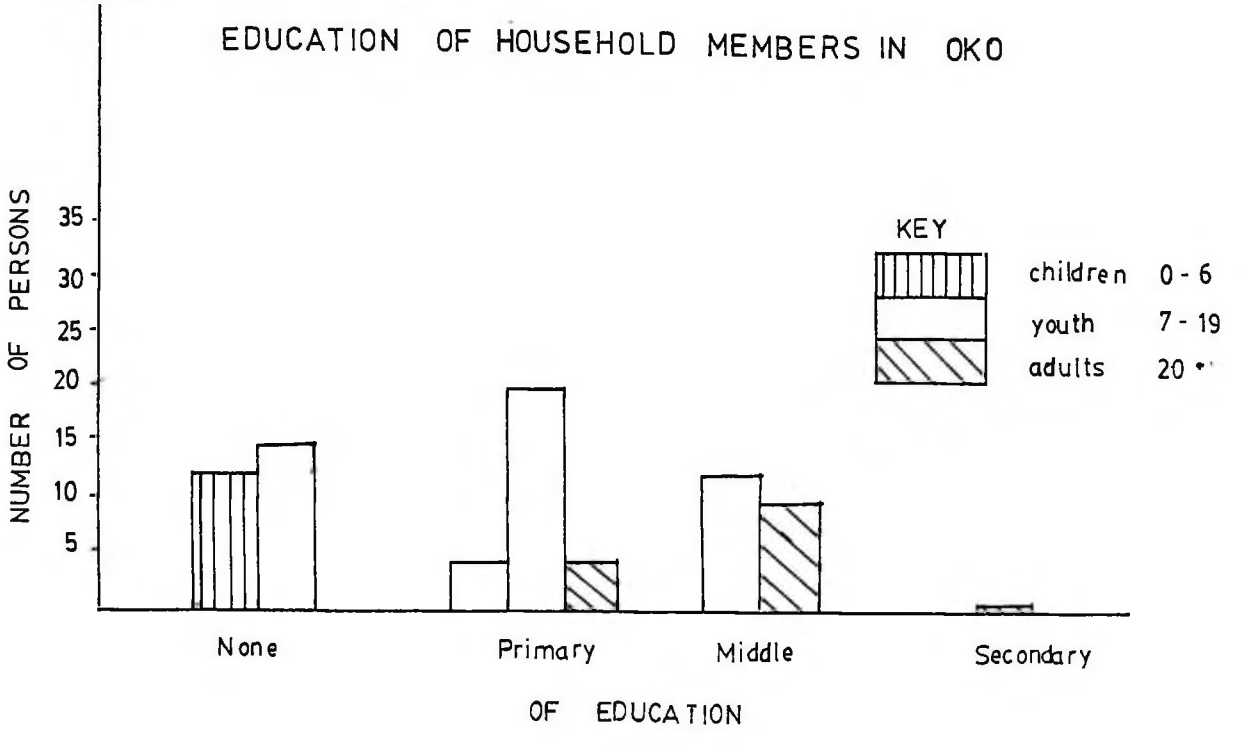


FIGURE 4

EDUCATION OF HOUSEHOLD MEMBERS IN OKO



village, as is the case in Oko. No children having reached the secondary school level remained in the villages since they had to go elsewhere for a secondary school education. Very few returned to the village after completing secondary school because jobs requiring an education were not available in the village. However, one adult resident of Oko did have a secondary school education. This particular resident could have found a job in the city but she stated that she felt an obligation to her family and therefore chose to remain in the village as the chief cook for fifteen family members.

Occupation

The occupation of adult males and females of each village is shown by data presented in Table 1. Oyibi is primarily a farming village with eight of its twelve males listing farming as their main occupation. Only four of the twenty-five females in Oyibi were farmers. However, thirteen females were involved in commerce which in many cases included selling food products from their farms. Thus farming as an occupation either directly or indirectly took precedence in Oyibi.

Only one male and two females in Oko were farmers. Most of the females in Oko were involved in commerce. This included selling fruit and making and selling kenkey and bread. Kenkey was prepared daily in one Oko household and all others purchased from this household. Fruit and bread were sold not only to the Oko inhabitants but also at the nearby stone quarries where many people from Oko and other villages worked as unskilled laborers.

Several females were involved in making and selling kenkey in

Table 1 - Main Occupation of Adult Household Members

Occupation	Oyibi		Oko	
	Male No. of Persons	Female No. of Persons	Male No. of Persons	Female No. of Persons
Unskilled	3	2	1	3
Skilled	1	1	3	1
Clerical	0	0	1	0
Commerce	0	13	0	8
Farmer	8	4	1	2
Retired	0	2	3	2
None	0	3	0	1
TOTAL	12	25	9	17

Oyibi since Oyibi was a considerably larger village than Oko. Three of the females in Oyibi had no outside occupation, suggesting that they were responsible for household tasks, including the care of their young children. The skilled workers of both villages held positions in Accra, thus commuting daily.

Reported Frequency of Consumption of Legumes and Leafy Green Vegetables

Origin and Use of Legumes

Data presented in Tables 2 and 3 show the reported use of all legumes and legume flours in both Oyibi and Oko. Based on this data, cowpeas, groundnuts and bambara nuts were the legumes commonly consumed in both Oyibi and Oko, with lima beans being used only in Oyibi. Cowpea flour and groundnut paste were both used in Oyibi, whereas Oko used groundnut paste but no cowpea flour. This was perhaps due to the fact that Oyibi had its own flour mill where cowpeas could be milled.

Data presented in Table 2 indicate that in Oyibi, all legumes excepting lima beans were found to be purchased more often than they were homegrown. Lima beans were frequently homegrown, but were used by only four out of thirteen households in Oyibi. Data presented in Table 3 show that homegrowing of legumes in Oko was as common or more common than purchasing them, except for bambara nuts which were purchased by five of the eight households. The popularity of consuming homegrown legumes in Oko might be accounted for by the fact that several backyard gardens had been established in which legumes were being grown, whereas Oyibi had no backyard gardens at the time of the study.

Data presented in Tables 4 through 7 show the methods of prepara-

Table 2 - Reported Use of Legumes and Legume Flours in Oyibi

	Number of Households: 13					
	Cowpeas	Groundnuts	Bambara Nuts	Lima Beans	Cowpea Flour	Groundnut Paste
	No. of Households	No. of Households	No. of Households	No. of Households	No. of Households	No. of Households
Origin						
Purchased	7	12	5	1	7	12
Homegrown	6	1	0	3	3	0
Not used	0	0	8	9	3	1
Times Used/Week						
0	0	0	8	9	3	1
1 - 4	13	12	5	4	10	12
5 - 9	0	1	0	0	0	0
Meals Used For						
Breakfast	13	3	5	4	10	11
Lunch	13	1	3	4	0	10
Supper	13	0	0	3	0	12
Snack	0	12	2	1	10	0

Table 3 - Reported Use of Legumes and Legume Flour in Oko

	Number of Households: 8				
	Cowpeas No. of Households	Groundnuts No. of Households	Bambara Nuts No. of Households	Cowpea Flour No. of Households	Groundnut Paste No. of Households
Origin					
Purchased	4	2	5	0	3
Homegrown	4	5	3	0	5
Not used	0	1	0	8	0
Times Used/Week					
0	0	1	0	8	0
1 - 4	6	6	8	0	8
5 - 9	2	1	0	0	0
Meals Used For					
Breakfast	7	4	2	0	3
Lunch	3	4	4	0	4
Supper	4	1	1	0	8
Snack	0	5	5	0	0

tion and storage of legumes and legume flours in Oko and Oyibi. Legumes were eaten at all meals but the method of preparation differed. In Oyibi, twelve of the thirteen households consumed cowpeas as an ingredient in soups or stews and these were eaten for breakfast, lunch or supper. It was observed that the soup was normally cooked for the evening meal in quantities greater than that which was needed for the meal. If the leftover portion was not consumed on the following day, the soup was reheated twice a day. In this way, it could be kept for up to three days.

It was observed that Oko's residents also used cowpeas in soup or stew, but more commonly (seven out of eight households) cooked cowpeas with garri, grated fermented cassava. One Oko resident reported an unusual way of preparing cowpeas by combining them with hot peppers, tomatoes, oil and fish. When this mixture was cooked, it was added to roasted cornflour to make banku, a fermented maize product. This is an example of a cowpea preparation method which might be used as a demonstration recipe because it introduces a variety of nutritious foodstuffs into the meal.

Households in both Oko and Oyibi reported that groundnuts were most frequently consumed as a snack food (by twelve and five households in each village respectively). Data presented in Table 5 show that most households in Oko roasted groundnuts, either alone or with cassava or maize. Only one household boiled their groundnuts fresh. Roasted groundnuts were considered more suitable as a snack food than were boiled groundnuts. Data presented in Tables 2 and 3 also show that groundnuts were sometimes consumed for breakfast and lunch. At these times the groundnuts were roasted with cassava or maize.

Bambara nuts as shown by data presented in Tables 2 and 3 were not usually consumed for supper, but were commonly consumed for breakfast, lunch or as a snack. The most common form of serving them was with fried plantain (Table 6).

Lima beans were used only in soup, thus tending to be consumed for breakfast, lunch or supper.

Cowpea flour, used only in Oyibi (Table 2), was consumed at breakfast or as a snack and was most commonly used (by nine out of thirteen households) in making akla-koose, which is a fried food similar to a doughnut.

Groundnut paste was most frequently consumed at the supper meal, although it was also commonly consumed at breakfast and lunch. The most common method of preparation for groundnut paste was in soups (Table 7). As already mentioned, this soup was consumed at all three meals and therefore would explain the reason for consumption of groundnut paste at all three meals. Several households used groundnut paste on bread, usually for the breakfast meal, but this was not too common.

Storage of Legumes

Data presented in Table 4 indicate that the majority of Oyibi's residents stored their cowpeas in polythene (polyethylene) bags, a method recommended by the extension agents to assist in the prevention of weevil infestation. Two of Oko's eight households stored cowpeas in this way, two households dried their cowpeas in the shells and stored them in baskets, and three households did not store cowpeas at all. The

Table 4 - Preparation and Storage of Cowpeas in Oyibi and Oko

	Oyibi No. of H.Hs: 13 Number of Households	Oko No. of H.Hs: 8 Number of Households
Preparation		
In soup or stew	12	5
With garri	6	7
With plantain	2	0
With rice	3	0
With banku	0	1
Storage		
In polythene bag	10	2
In bowl or tin	3	1
In shells in basket	0	2
Not stored	0	3
Length of Storage		
None	0	3
1 - 2 weeks	3	0
3 - 4 weeks	5	1
2 - 3 months	5	1
4 - 6 months	0	3

Table 5 - Preparation and Storage of Groundnuts in Oyibi and Oko

	Oyibi Number of Households	Oko Number of Households
Preparation		
Roasted	13	0
Roasted with cassava	1	3
Roasted with maize	1	6
Boiled fresh	0	1
Storage		
Not stored	11	2
In polythene bag	2	1
Dried and hung in smoke	0	1
In sacks	0	4
Length of Storage		
None	11	2
Up to 1 month	2	0
Up to 6 months	0	2
Up to 1 year	0	4

Table 6 - Preparation and Storage of Bambara Nuts and Lima Beans in Oyibi and Oko

Bambara Nuts	Oyibi Number of Households	Oko Number of Households
Preparation		
Dried and cooked	1	0
With fried plantain	4	6
Cooked in shell	0	2
Storage		
Not stored	1	3
In polythene bag	4	1
Sacks or tins	0	4
Length of Storage		
None	1	3
1 - 2 weeks	3	0
3 - 4 weeks	1	0
2 - 3 months	0	5
Lima Beans		
Preparation		
In soup	4	
Storage		
In polythene bag	3	
In covered bowl	1	
Length of Storage		
2 - 3 days	1	
2 - 3 weeks	1	
2 - 3 months	2	

Table 7 - Preparation and Storage of Cowpea Flour and Groundnut Paste in Oyibi and Oko

Cowpea Flour	Oyibi Number of Households
Preparation	
In akla-koose	9
In stew	1
Storage	
Not stored	8
In covered bowl	1
In polythene bag	1
Length of Storage	
None	8
1 week	1
1 month	1

Groundnut Paste		Oko Number of Households
Preparation		
In soup	12	8
With bread	2	2
With cassava ampesi	1	0
With akasa	2	0
Storage		
Not stored	4	4
In polythene bags	1	0
In bowl or bottle	7	4
Length of Storage		
None	4	4
1 week	8	0
1 - 3 months	0	4

most common length of storage time seemed to be from one to three months, but three of Oko's households claimed to have kept their cowpeas for up to six months. The method used for this longer storage time was not recorded by the interviewer.

The greatest problem accompanying the storage of cowpeas was that of weevil infestation. It is obvious from the results given (Table 4) that few if any of the households in Oyibi or Oko were able to keep their cowpeas from one season to the next. Observations in Oko revealed that cowpeas planted in backyard gardens were infested with weevils even before harvesting was begun. Several of the residents in Oko mentioned that they had asked the Ministry of Agriculture for insecticides, thus indicating that they were aware of how to alleviate the situation. However, they were unable to obtain any insecticides. If cowpeas are infested with weevils at harvest time, then the problem is certain to continue during storage under normal conditions.

Groundnuts were not as frequently stored (Table 5). Eleven and two households respectively from Oyibi and Oko did not store groundnuts at all. Half of Oko's residents stored groundnuts in sacks and these were reported to be stored for up to one year.

Bambara nuts, like cowpeas, were most commonly (four out of thirteen households) stored in polythene bags in Oyibi whereas sacks or tins were the most common method (four out of eight households) of storage in Oko, with three households not storing them at all. Oyibi residents stored their bambara nuts for one to four weeks but the people in Oko stored them for two to three months (Table 6). The chief of Oko stated that he at one time grew bambara nuts but found that it was not

worth the effort since they became infested with weevils in two months time. Weevil infestation appears to be the overriding limitation to storage. However, he found that if the nuts were stored in their shells, the weevils could not get at them so readily and therefore their storage life was lengthened. This method of storage, however, requires considerably more storage space.

The lima beans in Oyibi were stored mainly in polythene bags (three out of four households) with one household storing their lima beans in covered bowls. The lima beans were stored for up to three months (Table 6).

Cowpea flour was infrequently stored (two out of ten households). If stored, it was put in a covered bowl or polythene bag and kept for one to four weeks (Table 7).

Groundnut paste was most commonly stored in a bowl or a bottle (seven and four households in Oyibi and Oko respectively), but a number of residents (four households in each village) did not store it at all (Table 7). If stored, groundnut paste was kept by Oyibi residents for only a week whereas Oko residents stored it for up to three months.

Origin and Use of Leafy Green Vegetables

Data presented in Tables 8 and 9 show the reported use of leafy green vegetables in both Oyibi and Oko. Nkontomire and bokoboko were the most commonly used leafy green vegetables in Oyibi, with all households surveyed using them. Aleefu and duadebaa were each used by only one household. All bokoboko, duadebaa and atomobaa were homegrown whereas shakpa was purchased and nkontomire and aleefu were both purchased and homegrown.

Table 8 - Reported Use of Leafy Green Vegetables in Oyibi

	Number of Households: 13					
	Nkontomire	Aleefu	Shakpa	Bokoboko	Duadebaa	Atomobaa
	No. of Households	No. of Households	No. of Households	No. of Households	No. of Households	No. of Households
Origin						
Purchased	7	2	1	0	0	0
Homegrown	6	6	0	13	5	1
Not used	0	5	12	0	8	12
Times Used/Week						
o	0	5	12	0	8	12
1 - 4	13	7	1	13	5	1
5 - 9	0	1	0	0	0	0
Meals Used For						
Breakfast	13	8	1	13	4	1
Lunch	13	8	1	13	4	1
Supper	11	7	1	12	3	1
Snack	0	0	0	0	0	0

Table 9 - Reported Use of Leafy Green Vegetables in Oko

	Number of Households: 8			
	Nkontomire	Aleefu	Shakpa	Bokoboko
	No. of Households	No. of Households	No. of Households	No. of Households
Origin				
Purchased	6	4	0	0
Homegrown	2	2	8	8
Not used	0	2	0	0
Times Used/Week				
0	0	2	0	0
1 - 4	8	6	7	8
5 - 9	0	0	1	0
Meals Used For				
Breakfast	7	5	5	6
Lunch	3	5	6	6
Supper	7	4	8	7
Snack	0	0	0	0

Table 10 - Methods of Preparation and Storage of Green Leafy Vegetables in Oyibi and Oko

	Nkontomire		Aleefu		Shakpa		Bokoboko		Duadebaa		Atomobaa	
	Oyibi No.of H.H.	Oko No.of H.H.	Oyibi No.of H.H.	Oko No.of H.H.	Oyibi No.of H.H.	Oko No.of H.H.	Oyibi No.of H.H.	Oko No.of H.H.	Oyibi No.of H.H.	Oko No.of H.H.	Oyibi No.of H.H.	Oko No.of H.H.
Preparation												
In soup or stew	13	8	8	6	1	8	13	8	5	0	1	0
Storage												
Not stored	2	7	1	6	1	1	3	3	3	0	1	0
In basket (dried)	11	0	7	0	0	6	10	5	2	0	0	0
Sprinkled with water	0	1	0	0	0	0	0	0	0	0	0	0
In plastic (dried)	0	0	0	0	0	1	0	0	0	0	0	0
Length of Storage												
None	2	7	1	6	1	2	3	3	3	0	1	0
2 -3 days	11	1	7	0	0	0	10	3	2	0	0	0
Over 1 month	0	0	0	0	0	6	0	2	0	0	0	0

Total Number of Households: Oyibi - 13, Oko - 8

The people of Oko did not use duadebaa and atomobaa at all. However, shakpa and bokoboko were consumed by one hundred percent of the households studied and all of it was homegrown. Nkontomire was also used by all households (Table 9) with most of it (six out of eight households) being purchased, and aleefu was used by six households with twice as much (four out of six households) being purchased as homegrown. Of those consuming leafy green vegetables, the majority of households in both villages reportedly ate them from one to four times a week.

Data presented in Table 10 show the preparation and storage methods of leafy green vegetables in Oyibi and Oko. Only one method of preparation, soup or stew, was reported for all leafy green vegetables, and therefore these vegetables were consumed for breakfast, lunch and supper but not for snacks. When prepared, the leaves were boiled in the soup until soft, removed and mashed, and then added back to the soup. The preparation of shakpa differed slightly in that it was cooked separately in water until soft, then added to the soup after draining, so the liquid used for cooking was discarded. The reason given for this procedure was the removal of a bitter taste from the leaves. Aleefu was often sliced raw and put into a stew just before cooking of the stew was complete, and therefore contributed more nutrients than the over-boiled, mashed leafy vegetables.

The most common method recorded for storing leafy green vegetables was that of storing them in a basket after drying. However, very few methods of storage were listed, and in many cases the leaves were not stored at all (Table 10). It was reported in Oyibi that shakpa could not be stored because it becomes very slimy in a relatively short period of time. Of the leaves that were stored by drying in Oyibi and Oko,

most were kept for two to three days. Only dried shakpa and bokoboko in Oko were kept for longer than one month.

Use and Storage of Bread, Rice and Sugar

Data presented in Table 11 indicate that bread was consumed at least once a week by all households in Oyibi and by all but one in Oko. Breakfast was the meal listed as most common for bread consumption in Oko. However, in Oyibi, more households (eleven out of thirteen) ate bread as a snack food rather than as a breakfast food. Bread as a snack food was often eaten with margarine and/or jam, or was served dry with a beverage. Bread was commonly stored in cloth, polythene bags or covered bowls and was normally kept for up to two to three days, although a few claimed to store it for one to two weeks. It was observed in Oko that one of the village traders travelled to Accra twice a week to buy bread which she sold to the villagers. Thus fresh bread was always available.

Households in Oyibi and Oko who ate rice (eleven and seven respectively), consumed it from one to four times per week. However, many of the household members stated that because of the price increases, not much rice was being consumed except for special holidays such as Christmas. The rice, when eaten, was taken for breakfast, lunch or supper. It was reported that rice was cooked with cowpeas, wrapped in leaves and sold by traders to the school children. Apart from rice and cowpeas, rice and stew and rice water were the most common ways of consuming rice. Dry rice was commonly stored in bowls or tins and kept for up to six months. None of this rice was homegrown, therefore storage for a long period of time was not so necessary, as it could be purchased at regular intervals.

Table 11 - Reported Use of Bread, Rice and Sugar in Oyibi and Oko

	OYIBI Number of Households:13			OKO Number of Households:8		
	Bread	Rice	Sugar	Bread	Rice	Sugar
	No. of Households	No. of Households	No. of Households	No. of Households	No. of Households	No. of Households
Times Used/Week						
0	0	2	0	1	1	1
1 - 4	13	11	13	5	7	5
5 - 9	0	0	0	2	0	2
Meals Used For						
Breakfast	10	9	12	6	4	7
Lunch	1	7	5	2	1	2
Supper	1	8	6	4	3	5
Snack	11	1	11	2	0	2
Storage						
In bags (paper)	0	0	0	2	0	0
In cloth	10	0	0	2	0	0
In plastic bags	1	4	1	2	2	5
In bowls or tins	0	3	10	0	4	2
Not stored	2	4	2	1	1	0
Length of Storage						
None	2	4	2	1	1	0
2 - 3 days	10	4	0	4	0	0
1 - 2 weeks	1	3	6	2	0	1
1 - 6 months	0	0	5	0	6	6

Sugar is another food that was used by all households in Oyibi and all but one in Oko, and it was most frequently used from one to four times per week (Table 11). It was commonly consumed at breakfast with cooked porridge or in a beverage, but was sometimes used at all meals. Sugar was kept in plastic bags, covered bowls or tins, and could be kept for as long as six months.

Attitudes Toward Legumes

Prior to this study, extension workers from the Ministry of Agriculture had stressed to the villagers the importance of legumes and leafy green vegetables because of their nutritive value. Because of this, the data collected on attitudes toward these specific food items probably contains a nutritionally oriented bias.

Data presented in Table 12 indicate the reported attitudes toward legumes of both Oyibi and Oko householders. This information was collected from the chief cook who represented her entire household. Cowpeas, groundnuts and bambara nuts were reported to be liked by all households in Oyibi who used them. Nutritive value and good taste were the reasons listed in Oyibi for serving these legumes. As already mentioned, survey participants may have listed nutritive value as a reason for liking legumes because the extension workers had previously taught them about nutritive value in these foods.

Data presented in Table 12 show that cowpeas and groundnuts were reported to be liked by most survey participants in Oko, and bambara nuts were reported to be liked by half of the households. Nutritive value and good taste were the most frequent reasons listed for serving

Table 12 - Attitudes Toward Legumes in Oyibi and Oko

	Like	Indifferent	Dislike	Nonrespondents
	Number of Households	Number of Households	Number of Households	Number of Households
Oyibi				
(1) Cowpeas	13	0	0	0
(2) Groundnuts	13	0	0	0
(3) Bambara Nuts	7	0	0	6
Oko				
(1) Cowpeas	6	1	1	0
(2) Groundnuts	7	0	1	0
(3) Bambara Nuts	4	1	0	3

	Oyibi			Oko		
	(1) No. of House-holds	(2) No. of House-holds	(3) No. of House-holds	(1) No. of House-holds	(2) No. of House-holds	(3) No. of House-holds
Reasons for Serving:						
Nutritive value	13	13	7	3	5	2
Good taste	11	11	7	5	5	1
Satisfying qualities	1	1	0	0	0	0
Economical	0	0	0	1	0	0
Reasons for Not Serving:						
Produces gas				3	0	0
Hard to chew				0	1	1
Causes coughing				0	1	1

cowpeas, groundnuts and bambara nuts. Several households in Oko disliked or were indifferent to the various legumes either because they produced gas (cowpeas) or because they were hard to chew and produced coughing (groundnuts and bambara nuts).

Attitudes Toward Leafy Green Vegetables

According to data presented in Tables 13 and 14, nkontomire was liked by all households in Oyibi and Oko. Reasons for liking or serving nkontomire in both villages were mainly nutritive value and satisfying qualities, although availability, cost and flavor were also mentioned. As with legumes, extension workers had stressed the importance of leafy green vegetables in the diet, and this may account for the high percentage of participants listing nutritive value as a reason for liking leafy green vegetables.

Aleefu was popular in Oyibi mainly for its nutritive value and satisfying qualities, but in Oko, aleefu was not so readily available. Several householders in Oko also mentioned that when aleefu was available, it gave frequent stools or was too expensive and thus was seldom used.

Shakpa was reported (Table 13) to be unavailable to most households (twelve out of thirteen) in Oyibi, and those who did have access to it reported that they were not familiar with cooking methods for shakpa. All households in Oko liked shakpa (Table 14) mainly because of its good flavor and the medicinal purposes attributed to it. Some also indicated that the cooking liquid of shakpa, as a drink, was a cure for many common diseases such as measles or chicken pox.

Table 13 - Attitudes Toward Leafy Green Vegetables in Oyibi

Vegetable	Like	Indifferent	Dislike	Unknown
	Number of Households	Number of Households	Number of Households	Number of Households
Nkontomire	13	0	0	0
Aleefu	12	0	0	1
Shakpa	0	1	0	12
Bokoboko	12	0	1	0
Duadebaa	2	1	3	7
Atomobaa	1	1	1	10

	Nkontomire	Aleefu	Shakpa	Bokoboko	Duadebaa	Atomobaa
	No. of Households	No. of Households	No. of Households	No. of Households	No. of Households	No. of Households
Reasons for serving:						
Availability	1	0	0	1	0	2
Cost	1	1	1	0	1	0
Nutritive value	12	11	0	10	2	0
Satisfying qualities	10	9	0	9	2	0
Color	0	1	0	0	0	0
Reasons for not serving:						
Non-available	0	2	6	0	0	2
Lack of cooking knowledge	0	0	2	1	6	5
Difficult to store	0	0	0	0	3	1

Table 14 - Attitudes Toward Leafy Green Vegetables in Oko

Vegetable	Like	Indifferent	Dislike	Unknown
	Number of Households	Number of Households	Number of Households	Number of Households
Nkontomire	8	0	0	0
Aleefu	3	2	2	1
Shakpa	8	0	0	0
Bokoboko	6	1	1	0
Duadebaa	0	0	2	6
Atomobaa	0	0	0	8

	Nkontomire	Aleefu	Shakpa	Bokoboko	Duadebaa	Atomobaa
	No. of House-holds	No. of House-holds	No. of House-holds	No. of House-holds	No. of House-holds	No. of House-holds
Reasons for serving:						
Availability	1	0	1	3	0	0
Cost	2	0	2	1	0	0
Nutritive value	5	2	1	1	0	0
Ease of Cooking	0	0	1	1	0	0
Flavor	2	1	4	1	0	0
Satisfying qualities	4	1	2	1	0	0
Medicinal	0	0	3	0	0	0
Reasons for not serving:						
Non-available	0	4	0	0	0	0
Lack of cooking knowledge	0	0	0	0	8	8
Frequent stools	0	1	0	2	0	0
Extravagant	0	1	0	0	0	0

Nutritive value and satisfying qualities were the main reasons listed by Oyibi households for liking bokoboko, whereas in Oko, bokoboko was liked or served mainly because of its availability. The reason for not serving bokoboko in Oyibi was reported to be a lack of cooking knowledge, while in Oko, bokoboko was claimed to give frequent stools and therefore was considered somewhat undesirable.

Duadebaa and atomobaa were not consumed by any of the households in Oko (Table 14), because of a lack of cooking knowledge. Several of Oyibi's households liked duadebaa and atomobaa. These household members also claimed a lack of cooking knowledge for these vegetables and found them difficult to store.

It is interesting to note that high cost or extravagance was listed only once as a reason for not consuming these specific food items (Table 14). Observation of eating patterns in the village households gave the impression that there never seemed to be a shortage of money to purchase food. This may account for the lack of concern over prices of these foodstuffs. It is also possible that the people did not want to admit that finances were a concern, and therefore they did not indicate high cost as a reason for not consuming legumes and leafy green vegetables.

These results show generally that there were a number of leafy green vegetables such as atomobaa and duadebaa in Oko and shakpa in Oyibi that were not being consumed at the time of the survey, and that unavailability and lack of cooking knowledge were most frequently listed as reasons for their non-consumption. The fact that storage of leafy green vegetables presented problems to the householder may account for the limited use of these vegetables.

Special Foods

Foods for Pregnant and Lactating Women

Data presented in Table 15 indicate that neither the women in Oyibi nor the women in Oko tended to eat special foods when they were pregnant. Only one woman in Oyibi consumed what she thought to be a special food - cassava and stew. One woman from Oko reported that she took special foods when pregnant only if it was recommended at the hospital.

Oyibi women similarly did not take special foods when lactating (Table 16) other than one woman who named palm soup as a special lactating food. Palm soup was taken by women in six Oko households during lactation and the reason given for this by the women was that the soup produced extra milk. Five of Oko's women indicated that they took fufu and soup, and this soup was likely to have been palm soup. Porridge and groundnuts were each listed once as being special for lactating women.

Age Children Are Weaned

The majority of the children in both villages were weaned between the ages of one and two years in Oyibi and Oko (Table 17). However, two women in Oko reported that they did not wean their children until three to four years of age.

Foods Given to Children During Weaning

Data presented in Table 18 show the various foods used to wean children and they indicate that most of the children received a typical

Table 15 - Special Foods Taken When Pregnant

Foods Taken	Total No. of Households:13 OYIBI	Total No. of Households:8 OKO
	Number of Households	Number of Households
No special food	12	7
Staple and stew	1	0
Hospital recommended	0	1

Table 16 - Special Foods Taken When Lactating

	Total No. of Households:13 OYIBI	Total No. of Households:8 OKO
	Number of Households	Number of Households
No special food	12	2
Palm soup	1	6
Porridge	0	1
*Fufu and soup	0	5
Groundnuts	0	1

* Fufu is pounded cooked cassava.

Table 17 - Age Children Are Weaned

Age of Weaning	Total No. of Households:13 OYIBI	Total No. of Households:8 OKO
	Number of Households	Number of Households
Below 1 year	1	1
1 - 2 years	11	4
2 - 3 years	1	1
3 - 4 years	0	2

Table 18 - Weaning Foods Given to Children

Foods Given	Total No. of Households:13 OYIBI	Total No. of Households:8 OKO
	Number of Households	Number of Households
Beverages (milo, tea)	8	1
Porridge	11	5
Rice and stew	6	1
Kenkey and soup or stew	13	3
Fufu and soup	6	3
Cooked staple and stew	11	4
Fruit	0	2
Milk	0	1

adult diet as soon as breast feeding had been terminated. All of Oyibi's mothers weaned their children on kenkey (a steamed fermented maize ball) and soup or stew, the traditional adult breakfast or lunch foods. Beverages were frequently used (eight out of thirteen households) in Oyibi but were not at all common in Oko, and except for one household, these beverages did not include milk. Maize porridge was quite widely used in both villages (eleven and five households in Oyibi and Oko respectively). Fruits and protein foods such as legumes were not often consumed.

Opportunity to Increase Food Production

Participants of this survey were asked whether they owned any land that was not being used. Twelve of the thirteen households in Oyibi said that they had extra land but only three of the eight in Oko had any unused land. When asked whether they would be willing to grow more legumes and leafy green vegetables, either on unused land or in place of another crop presently being grown, all of the participants in Oyibi and seven of Oko's households said that they would be willing. This indicates a real opportunity for local Technical Officers to encourage the production of more protein foods in the form of legumes and leafy green vegetables. However, the possibility exists that the survey participants may have been influenced by this study and consequently responded in a manner that they thought would be pleasing to the author.

Table 19 - Willingness to Use Extra Land for Legume and Leafy Green Vegetable Production

	Total No. of Households: 13 Oyibi No. of Households	Total No. of Households: 8 Oko No. of Households
Availability of Unused Land		
Yes	12	3
No	1	5
Willingness to Put Extra Land Into Legumes and Vegetables		
Yes	13	7
No	0	1

Recorded Food Consumption Data

Foods Consumed During the Three Day Period in Oyibi and Oko

For a period of three days, the interviewers visited each household during the time of the evening meal preparation to record the menu for that meal and to weigh each item of the meal. The other meals of the day were recalled at this time, using an estimated serving size.

Foods Consumed for Supper

The supper meal was quite different from either breakfast or lunch in that most households spent a considerable length of time preparing and cooking the evening meal. Data presented in Table 20 show that the combination of fufu and soup was by far the most common food served, with cooked staple and vegetable stew the next most popular. Kenkey was used for supper occasionally. It was observed that kenkey was used for supper only if the cook returned to the village too late to prepare fufu, which took approximately one to one and a half hours to prepare, or if cassava had not been collected from the farm. Rice and cowpeas were prepared in only one household, and when questioned about the use of rice, most villagers replied that, unlike vegetables, it had become too expensive to use. However, according to data presented in Table 11, most households in both Oyibi and Oko claimed to use rice at least once a week. It may be that the increase in cost of rice had changed their eating habits without the household members realizing it. The infrequent consumption of yams (mpotompoto) was reported to be due to excessive cost.

Table 20 - Foods Consumed for Supper During a Three Day Survey

Total Possible Meals: Oyibi - 39, Oko - 24

Food	Frequency of Consumption over the 3-day period (Households)	
	Oyibi	Oko
Fufu and soup	30	16
Cooked staple and stew	5	4
Kenkey and soup or stew	3	3
Rice and cowpeas	1	0
*Mpotompoto	0	1

* A mashed yam dish

Foods Consumed for Breakfast

Data shown in Table 21 indicate that kenkey served with either soup or stew was the most common breakfast food in both Oyibi and Oko. Both villages had at least one and sometimes several ladies preparing kenkey each day for sale to the other villagers. Kenkey, therefore, is a ready-prepared convenience food, allowing for a simple breakfast which eliminates the need for cooking in the individual households. The soup or stew eaten with kenkey was most often a leftover from the supper meal and thus required only reheating.

Cooked cereal was also fairly common as a breakfast food, and in Oyibi and Oko, this cereal was usually koko, a cooked maize porridge.

The cooked staple and stew referred in most cases to ampesi, or cooked cassava, served with a stew left over from the last day's evening meal.

Although bread is not consumed every day, it is becoming more popular in Ghana, and since there are village traders who have bread available for sale, it is a very convenient breakfast food. This bread was sometimes served with margarine and jam, but often was served dry with a beverage such as tea or milo, a chocolate drink.

Cowpeas and garri were quite popular in Oko but not in Oyibi as a breakfast food. This food would require more time for preparation since cowpeas demand a long cooking period.

Wheat flour doughnuts fried in coconut oil were occasionally eaten as a breakfast food. These doughnuts were purchased from a food trader.

Table 21 - Foods Consumed for Breakfast During a Three Day Survey

Total Possible Meals: Oyibi - 39, Oko - 24

Food	Frequency of Consumption over the 3-day period (households)	
	Oyibi	Oko
Kenkey and soup or stew	17	10
Cooked cereal	13	4
*Cooked staple and stew	7	5
Bread	6	6
Beverages	2	4
Garri and cowpeas	0	6
Doughnuts	4	1
Garri and stew	1	0
Garri and soup	0	1
Nothing	1	0

Foods Consumed for Lunch

Lunch time foods were similar to those served for breakfast, as ready prepared convenience foods were popular and little cooking was done. Data presented in Table 22 show that kenkey with soup or stew was the most popular lunch food in both Oyibi and Oko. Cooked staple with soup or stew was also frequently consumed. There were more household members at lunchtime than at any other meal who did not prepare any food, thus suggesting that household members ate elsewhere or not at all.

Consumption of Leafy Green Vegetables and Legumes

Nkontomire and shakpa were the only leafy green vegetables consumed in any of the twenty-one households surveyed in both villages (Table 23). Of these, nkontomire was the most popular leafy green vegetable but even so it was used in only five meals out of a possible total of 189, and almost entirely in the village of Oyibi. Referring to data presented in Table 8, nkontomire was reported to be used from one to four times per week by all of Oyibi's households. Thus it appears that reported frequency of use was greater than actual frequency of use.

Data presented in Table 23 show that shakpa was used only twice in Oko and not at all in Oyibi. Data presented in Table 8 show that shakpa was reported as being used only once a week by one household in Oyibi and thus it is not surprising to find that shakpa was not used in Oyibi during the three day survey. All of Oko's households reported the use of shakpa at least once a week (Table 9), and yet it was used only twice during the three day survey, thus indicating that reported use of

Table 22 - Foods Consumed for Lunch During a Three Day Survey

Total Possible Meals: Oyibi - 39, Oko - 24

Food	Frequency of Consumption over the 3-day period (Households)	
	Oyibi	Oko
Kenkey and soup or stew	17	11
*Staple and soup or stew	14	3
Nothing-	2	3
Garri and cowpeas	1	1
Porridge and bread	1	1
Sweet potato	1	0
Rice water	1	0
Fufu and soup	0	1
Doughnut	0	1
Garri and soup	0	1

* staple usually refers to cooked cassava.

Table 23 - Frequency of Consumption and Origin of Leafy Green Vegetables and Legumes During a 3-Day Survey

Food	Total No. of Households (13) OYIBI			Total No. of Households (8) OKO		
	Times Used	Origin P	H	Times Used	Origin P	H
Nkontomire	4	3	1	1	0	1
Shakpa	0	0	0	2	0	2
Cowpeas	3	2	1	8	8	0
Groundnuts	9	9	0	0	0	0
Groundnut soup or stew	1	1	0	5	5	0

P: Purchased
H: Homegrown

Total number of possible meals: Oyibi - 117
Oko - 72

shakpa was higher than recorded use. All other leafy green vegetables (aleefu, bokoboko, duadebaa and atomobaa) that were reported to be used in Oyibi and Oko (Tables 8 and 9) were not consumed at all during the three day survey. It was suggested by some of the villagers that the use of leafy green vegetables during the food consumption survey was low because of very dry weather conditions resulting in reduced yields during that harvest. However, this survey was conducted during or immediately following the harvest season, and thus was the time of year when foods would be most readily available. Because of this, the discrepancy between actual and reported consumption appears to be larger than expected.

Data presented in Table 23 show frequency for consumption of legumes. Cowpeas were consumed eight times in Oko out of a possible seventy-two during the three day survey. These results agree with data shown in Table 3 where cowpeas were reported to be consumed at least once a week by all households in Oko. Cowpeas, however, were only consumed three times in Oyibi during the survey, and according to data presented in Table 2, they should have been consumed by all households in Oyibi at least once a week. This indicates that the reported frequency of cowpeas may have been exaggerated.

Groundnuts were consumed nine times in Oyibi, and this figure agrees with data presented in Table 2 where groundnuts were reported to be consumed by all households at least once a week. Most of these groundnuts were reported to be consumed as a snack food. In Oko, groundnuts appeared not to be consumed at all, but this is possibly an error due to the fact that the interviewer failed to record snack foods in Oko.

Groundnut paste in soup or stew was used five times in Oko but only once in Oyibi during the survey (Table 23). According to data presented in Tables 2 and 3, groundnut paste was reported to be used by almost all households in both villages at least once a week. These results indicate a higher reported frequency of use for groundnut paste in Oyibi than actual consumption.

Reported use of lima beans and bambara nuts (Tables 2 and 3) does not agree with actual consumption since no lima beans or bambara nuts were consumed during the three day survey in either village.

It is interesting to note from data presented in Table 23 that almost all of the legumes were purchased rather than homegrown. According to data presented in Tables 2 and 3, approximately half of the cowpeas consumed were reported to be homegrown, yet only one household in Oyibi used homegrown cowpeas during the survey period. Leafy green vegetables consumed in Oko were all homegrown (Table 23) but most of the nkontomire in Oyibi was purchased rather than homegrown. This information should be of interest to those promoting the production and use of homegrown food products. These results, however, indicate that many of the legumes and leafy green vegetables in the two sample villages were purchased, possibly as a result of poor crops due to very dry weather conditions.

Attendance of Household Members at Meals

A meal attendance record was kept for all household members attending each meal during the three-day survey (Table 24).

Seventy-nine percent of all household members in Oyibi were at

Table 24 - Average Meal Attendance for Breakfast, Lunch and Supper During the Three Day Survey

Meal Attendance	Breakfast				Lunch				Supper			
	Oyibi	%	Oko	%	Oyibi	%	Oko	%	Oyibi	%	Oko	%
At home	280	79	160	75	309	87	111	52	347	98	201	94
Another home	0	0	2	1	0	0	2	1	0	0	2	1
No meal	4	1	6	3	4	1	13	7	0	0	9	4
At farm or food seller	70	20	45	21	41	12	87	40	7	2	1	1
Total	354	100	213	100	354	100	213	100	354	100	213	100

home for breakfast, eighty-seven for lunch and ninety-eight percent for supper, whereas seventy-five percent of all household members in Oko were at home for breakfast, fifty-two percent for lunch and ninety-four percent for supper. These results indicate that the evening meal was the one at which most household members were present.

It was observed in Oyibi that many household members left the village for the farm very early in the morning, thus explaining why twenty percent of the household members ate breakfast from a food seller or at the farm. Most of the farmland was a considerable distance from the village houses. The villagers worked from early morning until mid-day and thus a greater percentage of them were at home for lunch than for breakfast. The majority of those eating away from home in Oyibi were children, but many adult males were also absent from breakfast and lunch.

In Oko, a larger proportion of the household members had jobs away from home and thus fewer of them (fifty-two percent) returned home for lunch. Forty percent of Oko's household members ate lunch at the farm or from a food seller. The majority of those eating away from home in Oko were children who normally bought food from a food seller at the school. Many adult females also ate away from home since they were involved in trading at the stone quarries and at other villages.

Number of People Eating From One Plate

Data shown in Table 25 indicate that more household members in Oko enjoyed the status of not having to share a plate than did those of Oyibi. In Oyibi, the most common number of people eating from one plate was four, whereas in Oko, the practice of four or more people

Table 25 - Number of People Eating From One Plate

Number eating from one plate	Oyibi (frequency)	Oko (frequency)
1	3	21
2	3	12
3	4	5
4	10	2
5	5	1
6	3	0
7	2	0

sharing a plate was relatively uncommon. No reason for the difference between villages was evident. A village such as Oko might therefore be of interest when looking at eating habits or nutrient intake of individuals. This could be used for the planning of nutrition programs for specific age groups.

Nutrient Intake From the Evening Meal

It was possible to assess the nutrient intake from the evening meal only, since it was at this meal that all foods were weighed. Foods consumed for breakfast and lunch were recorded as recalled in various household measures, but due to the great degree of error that could be present in estimating portion size (Marr, 1971), it was decided that the nutrient content of the weighed food only would be calculated. It has been assumed, based on observations in the two villages, that the evening meal constitutes approximately fifty percent of the entire day's food intake, but not necessarily fifty percent of the day's nutrient intake, and thus cannot be used to represent a percentage of the day's nutrient intake.

Data presented in Tables 26 and 27 show the grams and calculated calories, protein, calcium and iron present in an average serving per person of the individual foods in the evening meal for each household. These figures were determined using the "Composition of Foods Commonly Used in Ghana" handbook (Eyeson et al, 1975). This handbook does not include vitamin content of foods and therefore only protein, calcium and iron have been considered. Figures presented in Tables 26 and 27 were used to calculate the per caput protein, calcium and iron content

of the evening meal, based on one-thousand kilocalories of energy (Table 28). For the purpose of this analysis, it has been assumed that the energy requirements have been met and the nutrients are being compared to the FAO recommended intake of nutrients as shown in Table 29. It should be noted that this method of averaging nutrient intakes across households and comparing these intakes with those of specific age groups is only approximate. However, individual analysis of nutrient intake would be very difficult to assess since several members of a household frequently share a plate.

Comparing the data presented in Tables 28 and 29, it is apparent that only one household in Oko (013) had a protein level that would fulfill, and actually far exceed, recommended intakes by each age group as specified by FAO. However, three households met all requirements except for pregnant or lactating women and one household provided enough protein to meet all recommendations except for adult, pregnant or lactating women. The remaining three households did not meet the protein requirements for any age group or other classification. It should be noted, as seen in data presented in Table 27, that two of these three households consumed the same type of food with no variation for three consecutive days. If more variation had been introduced into the evening meals, it is possible that they would have been more likely to meet the nutrient requirements. Also, household 013 which consumed more than adequate protein, consumed banku in place of fufu and a meat stew in place of soup, both making a considerable contribution to protein content.

In Oyibi, five out of thirteen households were deficient in protein, according to FAO recommended intakes for certain classifications. Again, several of these households consumed the same types of foods for

Table 26 - OYIBI: Calculated Average Nutrient Intake From the Evening Meal Over a Period of Three Days

Household No.	Food Consumed	per person				
		Grams	Calories	Protein (gm)	Calcium (gm)	Iron (mg)
095	fufu & light soup (3)*	2063.88	1602.57	27.75	.40	8.31
062	ampesi & nkontomire stew	587.25	950.58	10.86	.14	6.69
	fufu & palm soup	603.45	816.40	7.48	.12	4.44
	kenkey & okro soup	518.40	485.35	13.73	.18	14.52
	Total	1709.10	2252.33	32.07	.44	25.65
061	fufu & palm soup (3)	2201.19	2978.88	27.18	.43	16.17
013	fufu & palm soup (2)	1121.42	1517.12	14.10	.22	8.24
	rice & cowpeas	502.20	542.54	17.93	.25	4.82
	Total	1623.62	2059.66	32.03	.47	13.06
054	kokonte & okro soup	496.13	1186.88	7.82	.25	9.43
	fufu & light soup	701.67	622.53	8.84	.12	3.22
	kenkey & okro soup	533.93	520.46	14.45	.18	15.76
	Total	1731.73	2329.87	31.11	.55	28.41
011	kenkey & nkontomire stew	535.50	752.66	17.92	.19	18.78
	fufu & palm soup (2)	1253.70	1697.60	15.00	.23	9.16
	Total	1789.20	2450.26	32.92	.42	27.94
074	kenkey & light soup	554.85	400.38	13.67	.15	11.61
	fufu & light soup	708.75	643.70	8.82	.12	3.33
	fufu & groundnut soup	797.85	1124.72	24.49	.18	8.47
	Total	2061.45	2168.80	46.98	.45	23.41

* Figures in brackets indicate number of days this meal was served.

Table 26 - (continued) OYIBI: Calculated Average Nutrient Intake From the Evening Meal Over a Period of Three Days

Household No.	Food Consumed	per person Grams	Calories	Protein (gm)	Calcium (gm)	Iron (mg)
081	fufu & light soup	699.30	616.52	8.84	.12	3.19
	fufu & palm soup (2)	1370.26	1852.78	17.72	.29	10.12
	Total	2069.56	2469.30	26.56	.41	13.31
064	fufu & light soup (3)	2126.25	1765.47	27.75	.39	9.15
076	fufu & palm soup (3)	1927.80	2603.67	26.43	.45	14.40
055	fufu & light soup (3)	3010.77	2890.35	36.27	.50	14.94
080	fufu & light soup (2)	1327.20	1329.22	15.58	.21	6.86
	fufu & palm soup	614.00	966.00	8.95	.14	5.25
	Total	1941.20	2295.22	24.53	.35	12.11
056	kokonte & groundnut soup	758.37	2045.69	23.11	.34	16.05
	fufu & palm soup	772.54	1043.57	10.49	.18	5.77
	fufu & light soup	822.15	641.42	11.03	.16	3.33
	Total	2353.06	3730.68	44.63	.68	25.15

* Figures in brackets indicate number of days this meal was served.

Table 27 - OKO: Calculated Average Nutrient Intake From

Household No.	Food Consumed	Grams
014A	fufu & palm soup (3)	2513.70
014B	fufu & groundnut soup	717.26
	fufu & light soup (2)	1207.72
	Total	1924.98
003	mpotompoto	402.57
	fufu & light soup (2)	1263.48
	Total	1666.05
013	fufu & light soup	701.66
	fufu & groundnut soup	460.69
	banku & meat stew	451.24
	Total	1613.59
008	fufu & okro soup (3)	2156.70
006	kenkey & fish stew	481.16
	fufu & palm soup	737.10
	fufu & light soup	682.53
	Total	1900.79
009	fufu & light soup	850.50
	fufu & palm soup	982.80
	fufu & groundnut soup	812.70
	Total	2646.00
007	Kokonte & groundnut soup	782.46
	Kokonte & palm soup (2)	1349.46
	Total	2131.92

the Evening Meal Over a Period of Three Days

per person			
Calories	Protein (gm)	Calcium (gm)	Iron (mg)
3398.79	32.52	.53	18.60
1008.53	20.88	.16	7.43
1200.92	14.24	.19	6.22
2209.45	35.12	.35	13.65
583.73	7.65	.01	11.27
1194.22	15.58	.21	6.18
1777.95	23.23	.22	17.45
527.73	9.57	.14	2.74
639.79	9.93	.08	4.19
448.83	27.99	.14	20.34
1616.35	47.49	.36	27.27
2155.19	27.36	.54	15.90
595.92	14.05	.14	17.17
996.33	9.70	.16	5.47
631.34	8.41	.12	3.27
2223.59	32.16	.42	25.91
710.64	11.05	.16	3.69
1326.40	13.95	.24	7.39
1142.69	23.64	.18	8.41
3179.73	48.64	.58	19.49
2007.74	26.07	.35	16.04
3635.38	21.32	.61	25.44
5643.12	47.39	.96	41.48

Table 28 - Average Nutrient Intake per Person Based on 1000 Kilocalories Energy

Household No.		Protein (gm)	Calcium (gm)	Iron (mg)
OKO				
014A		9.57	.16	5.47
014B		14.81	.16	5.91
003		13.07	.12	9.88
013		32.00	.23	19.02
008		12.13	.24	7.05
006		15.54	.19	13.16
009		15.59	.19	6.04
007		8.23	.17	7.33
	Mean	15.12	.18	9.23
	Standard Deviation	3.62	.04	4.71
OY1B1				
095		17.3	.25	5.18
062		14.22	.20	11.37
061		9.15	.14	5.44
013		15.59	.23	6.35
054		13.38	.24	12.22
011		13.38	.17	11.36
074		21.61	.21	10.76
081		10.71	.17	5.37
064		15.73	.22	5.19
076		10.13	.17	5.52
055		12.57	.17	5.18
080		10.72	.15	5.29
056		11.90	.18	6.70
	Mean	13.56	.19	7.38
	Standard Deviation	3.41	.04	2.86

Table 29 - FAO Recommended Intakes of Nutrients for Developing Countries (Average Figures) per 1000 Kilocalories of Energy

Age	Energy (kilocalories)	Protein (grams)	Calcium (grams)	Iron (milligrams)
Child 1-9	1000	12.30	.26 - .39	3.2 - 6.5
Male Adolescent 10-19	1000	12.25	.18 - .25	1.8 - 6.3
Female Adolescent 10-19	1000	12.59	.25 - .29	2.1 -10.1
Adult man	1000	12.33	.13 - .17	1.7 - 3.0
Adult woman	1000	13.18	.18 - .23	6.4 -12.7
Pregnant woman	1000	14.90	.39 - .47	5.5 -11.0
Lactating woman	1000	16.73	.36 - .44	5.1 -11.0

Source: FAO, 1974. Handbook on Human Nutritional Requirements

the three consecutive days. Six of the remaining households had sufficient protein for all FAO age agroups, excepting pregnant or lactating women, and the remaining two households had sufficient protein for all age groups.

It should be noted that although protein intake was relatively low during the evening meal, it cannot be assumed that this figure is representative of the entire day's protein intake. Data presented in Tables 20, 21 and 22 indicate that legumes were most popular at breakfast and lunch, thus possibly making a greater contribution to total protein intake. Also, kenkey was the major staple for breakfast and lunch, and this convenience food has a considerably higher protein content than does fufu (Eyeson and Ankrah, 1975). Therefore, if nutrient intake was calculated from foods consumed for all meals of the day, the protein intake would probably be higher than that indicated by the evening meal. Another major protein source in the diet of the people in the two sample villages was groundnuts. This food, usually consumed as a snack food, might raise the protein intake to the recommended intake as specified by FAO for various age groups in developing countries.

The calcium intakes of all households in Oko and Oyibi were low (Table 28). None met FAO recommendations for a child, a female adolescent, a pregnant or lactating woman. There was little or no milk consumed in either of the two villages. A possible source of calcium would be bones of fish which would normally be consumed in most households during the breakfast or lunch meal. Thus, the calcium intake from breakfast and lunch might improve the day's total calcium intake.

Iron intake in both villages was found to be adequate for all except adult women. In Oko, three inadequate intakes were noted for adult women. Iron intake in Oyibi was slightly lower with eight households having an average intake that was insufficient for adult women. Other age groups as specified by FAO were well supplied with iron from the evening meal.

From these findings, it is obvious that protein and calcium intakes in both Oko and Oyibi were relatively low in most households for the evening meal. Iron intake was insufficient for only the adult woman, as determined from the evening meal. However, to accurately assess the nutrient intake per person per day, it would be necessary to calculate the nutrient intake of the breakfast and lunch meals as well, since some foods consumed at these meals differ from the foods consumed at the evening meal.

It should be stressed that the results of this study represent the nutrient intake of the evening meal only, and they cannot be used alone to determine the nutritional status of the villagers, as Beaton et al (1966) have emphasized. Also, the number of households in the survey are very few and therefore do not necessarily represent the entire village population.

GENERAL DISCUSSION

The general objective of this study was to assess food consumption at the household level in relation to selected nutrients in the two villages of Oko and Oyibi, placing emphasis on the consumption of legumes and leafy green vegetables. The calculation of calories, protein, calcium and iron intakes was made, based on foods consumed for the evening meal. Calculation of vitamin intakes from the evening meal would also have been useful in evaluating the total nutrient intake. However, the calculation of nutrients was completed using Eyeson's "Composition of Foods Commonly Consumed in Ghana" and the foods represented in this handbook were not analyzed as to vitamin content. International food tables were not used to calculate the vitamin content of these foods, since the foods listed in an international food table are quite different from specific Ghanaian foods. Values for nutrients in foods listed in international food composition tables are in many cases unsatisfactory (Watson, 1971).

Intakes of protein and calcium at the evening meal, were shown to be low for those surveyed in both Oko and Oyibi (Table 28). This was largely because the main staple used in each of these villages was cassava. Protein content and quality are especially low in cassava which is lacking in the essential amino acids methionine, cystine and lysine (Siegel and Fawcett, 1976). Addition of legumes would bring some improvement to a cassava diet. However, legumes are also poor sources of methionine and cystine and therefore a further supplement such as that obtained from cereal is necessary to provide a diet in which the protein requirements are met. A cereal-legume combination with cassava

would improve the nutritive value of the meal. However, in Oko and Oyibi, cassava is commonly consumed for the evening meal whereas cereal, in the form of maize kenkey, is usually consumed for breakfast and lunch (Tables 20, 21 and 22). In order for the amino acids to be fully utilized and effective, they must be ingested simultaneously. Thus, to improve the diet of the Ghanaians living in Oko and Oyibi by the consumption of more legumes, it might also be necessary to change some of their eating patterns. This would involve the consumption of both cereals and legumes at the evening meal to improve the cassava based diet.

Cowpeas, bambara nuts and groundnuts are the legumes that were reported to be most commonly consumed in Oko and Oyibi at the time of the survey. Lima beans were reported to be eaten occasionally, but only in Oyibi. Data presented in Table 23 show that the actual frequency of consumption of these legumes was relatively low and that lima beans and bambara nuts were not used at all.

At a symposium on legumes held at the University of Ghana in December, 1976, Doku stated that bambara nuts and lima beans were both drought resistant legume varieties. Lima beans were also reported to be very resistant to insects. It would seem, therefore, that lima beans and bambara nuts would be suitable legumes for the villagers of Oko and Oyibi to plant in their backyard gardens, since insect infestation and dry weather conditions were both mentioned by the villagers as reasons for the non-consumption of legumes. Doku (1976) stated that cowpeas were especially susceptible to insect infestation and that the production of cowpeas could be increased by up to three times if cowpeas

were sprayed with insecticide. It follows, therefore, that if the villagers in Oko and Oyibi could obtain some insecticide, the incentive to grow their own backyard gardens might be increased.

Legumes are a good protein source (Patwardhan, 1962), but they have a very low vitamin content (Aykroyd et al, 1964). Therefore, foods other than legumes should be introduced into the diet in order to improve the vitamin content, provided the diet requires improvement. Leafy green vegetables could possibly assist in meeting the vitamin requirements. This study revealed that leafy green vegetables such as duadebaa and atomobaa in Oko and shakpa in Oyibi were reportedly seldom used (Tables 8 and 9). Reasons for their non-use were often reported to be unavailability or lack of cooking knowledge. However, data presented in Table 23 show that nkontomire and shakpa were the only leafy green vegetables consumed during the survey, and the frequency of consumption of these vegetables was very low. Therefore, it was concluded that the reported frequency of consumption of leafy green vegetables in general was higher than the actual frequency of consumption as recorded in the food consumption survey. It was also found that many of these leafy green vegetables were purchased rather than homegrown.

Susceptibility to insects may influence the types and amounts of leafy green vegetables grown in backyard gardens in Oko and Oyibi. It was observed in one backyard garden planted in Oko that the nkontomire was healthy, but that the aleefu and the bokoboko were covered with locusts and consequently the leaves had many insect holes. As with legumes, if proper insecticides could be obtained for the gardens, more villagers might be willing to spend more time and energy in preparing

and caring for their gardens.

It was also observed in the backyard gardens in Oko that all plants were grown in a haphazard fashion. There were no organized rows, thus making it very difficult for weeding and for harvesting. Advice on proper spacing of the vegetable plants might be beneficial to the villagers in that proper spacing could result in increased yields from their vegetable plants.

Since the survey was conducted during the harvest season, one might expect to see considerable use of both legumes and leafy green vegetables. However, the consumption of both of these foods was quite low. The dry weather resulting in poor crops was commonly reported as a reason for the low consumption of these foods during the survey. Backyard gardens on a small scale should not be affected to such a great extent by the dry weather conditions since the gardens can be watered daily, providing the village has an adequate water supply.

From the results of this study, one might assume that if backyard gardens were established, more leafy green vegetables and legumes would be available at all times. However, in order to produce a continuous supply of legumes and vegetables from garden plots, one must consider associated factors such as the water supply, the fertility of the soil, pests, and fencing because of the chickens and the goats. The planting of legumes in backyard gardens would assist in maintaining nitrogen fertility of the soil. The problem of pesticides would definitely have to be dealt with to make the effort of planting backyard gardens worthwhile.

The production of legumes and leafy green vegetables is a first step in improving the diet, but in order to be useful, these legumes

and vegetables must be properly prepared. The Home Science Department at the University of Ghana has experimented with recipes using leafy green vegetables. The cassava leaf, for example, is one which is certainly available in both Oko and Oyibi, since cassava is the main staple. The cassava leaf is frequently fed to the goats but is seldom consumed by the people. Tasty dishes made from cassava leaves would be very appropriate for the people of Oko and Oyibi. It is important that the time of cooking leafy green vegetables be experimented with in an attempt to retain the nutrients and still have an acceptable product. The Food Research Institute in Accra has developed and published nutritious cowpea recipes including some for weaning foods. These and other recipes, if introduced at the village level, might assist in improvement of the diet.

Results of the National Nutrition Survey of Ghana revealed that food distribution in the Ghanaian family was unequal (den Hartog, 1972). It was not possible to record individual consumption of food in the survey reported here because in most instances, several household members shared a plate. Therefore it should be noted that the nutrient intakes calculated from the evening meal (Table 28) are average figures per household. If an individual food consumption survey had been conducted, these figures might have been quite different due to unequal food distribution among the household members. Men are often given first choice of food and consequently the more vulnerable groups such as children and pregnant and lactating mothers, suffer (May, 1965, den Hartog, 1972). Children are vulnerable because they depend completely

on others for their food. It has been reported that small children are often denied protein foods (Mayer, 1959) and that some of the young children in Ghana lack fifty percent of their energy requirements (den Hartog, 1972). Therefore, the average household figures listed for protein intake per 1000 kilocalories of energy may be enough according to FAO standards, but in actual fact, the children may not be getting the protein. Pregnant and lactating mothers are also vulnerable groups because of their relatively greater nutritional needs. Thus, concentrated efforts should be made to ensure that children as well as pregnant and lactating women receive a nutritious diet.

The changing of peoples' food habits is not a simple task because people are not always willing to accept new methods of food preparation. However, the cooperation evident among residents of Oko and Oyibi during the survey was a good indication that these people are interested in the improvement of their diet.

RECOMMENDATIONS

The following are recommendations that have evolved during the assessment of the results of this study and may be useful in the planning of extension programs for the two villages of Oko and Oyibi. These recommendations may be especially useful to the Home Science Department at the University of Ghana, in the Department's attempt to conduct research in collaboration with the Home Extension Unit.

1. The general objective of this study was to assess food consumption at the household level, in relation to its nutrient profile in Oko and Oyibi. Nutrient intake of the evening meal was calculated using food composition tables. In future, it might be useful to calculate the nutrient value of foods consumed for breakfast and lunch to see whether foods consumed during these meals would increase the day's total nutrient intake.

2. The vitamin content of foods commonly consumed in Ghana has not yet been analyzed. However, it might be assumed, based on the high consumption of foods such as palm soup and mangoes, that Vitamin A requirements would probably be met. Ascorbic acid levels would probably be met as well since there were reported to be plenty of citrus fruits and tomatoes eaten in the villages. The B Vitamin requirements, however, might be more difficult to meet, and it is therefore recommended that the Vitamin content in foods in the two sample villages be calculated after the Food Composition handbook has been completed.

3. Pregnant and lactating women are not presently consuming any special foods, and it is indicated from the nutrient intake analysis of the evening meal that, based on average nutrient intake figures, these two groups of women are often lacking protein, calcium and iron. Therefore it is recommended that the village women be further educated as to nutrient requirements for pregnant and lactating women. These women could also be taught how these requirements might be met in the diet.

4. The weaning foods listed for children are, in most cases, the same as the average adult diet. The knowledge of growth foods and the maintenance of growth of the child are very important to the mother. It is recommended that the mother be taught these things in order that she can evaluate and select the proper local foods for the diet of her child.

5. Specific objectives of this study included the identification and the frequency of consumption of legumes and leafy green vegetables consumed in Oko and Oyibi. Results of the study indicate that leafy green vegetables such as atomobaa and duadebaa in Oko and shakpa in Oyibi were rarely consumed because of unavailability or a lack of cooking knowledge regarding these vegetables. It is therefore recommended that research be conducted on the vegetables, particularly those that are infrequently consumed in each village. The new workshop/laboratory erected at the University of Ghana might be useful for conducting experiments on the cooking methods of different leafy green vegetables.

The Home Science Department, with assistance from the Crop Science Department, might also be willing to conduct research on the planting and growth of the particular leafy green vegetables mentioned in this study. It is further recommended that any improvements in the planting or cooking methods for leafy green vegetables which may evolve, be demonstrated to the people of Oko and Oyibi. It would be convenient for those villagers possessing backyard gardens to grow a variety of leafy green vegetables as well as legumes and other food crops in their gardens. Encouragement for more backyard gardens could be given. The backyard gardens would be more convenient to the household since the farms are generally a considerable distance from the village. Close proximity to the home would be less time-consuming for watering, weeding and harvesting.

6. A further objective of this study was to assess the storage and handling of the legumes and the leafy green vegetables in the diet of those living in Oko and Oyibi. It was found that leafy green vegetables were stored for a very short period of time. Therefore, improved storage methods for leafy green vegetables might be developed and demonstrated to the villagers in order that these vegetables be consumed throughout the year rather than only during the harvest season. Once again, the Home Science workshop/laboratory might be used to conduct research on drying and other storage methods.

SUMMARY AND CONCLUSIONS

The objective of this study was to assess the food consumption in relation to its nutrient profile in two Ghanaian villages, placing emphasis on the consumption of legumes and leafy green vegetables. This was accomplished by identifying the various legumes and leafy green vegetables in the two villages, recording the frequency of consumption of each, and investigating such factors as availability, storage and handling, and attitudes associated with the preparation and consumption of legumes and leafy green vegetables in the diet of the villagers. A three-day food consumption survey was conducted in sample households of each village in order to record daily food consumption. Two Ghanaian interviewers were hired to administer a questionnaire prepared to record the required data.

Cowpeas, groundnuts and bambara nuts were found to be the legumes most commonly consumed in Oko, with the same legumes plus lima beans being consumed in Oyibi. Green leafy vegetables consumed in Oyibi included nkontomire, aleefu, shakpa, bokoboko, duadebaa and atomobaa, with people in Oko consuming the same group of leafy green vegetables except for duadebaa and atomobaa.

The frequency of consumption of each of these legumes and leafy green vegetables was measured in two ways: as reported and as recorded in the consumption survey. The results of the two measurements were quite different. The frequency of consumption of legumes and leafy green vegetables in general was higher than the actual frequency of consumption as recorded in the food consumption survey.

Results of the food consumption survey showed that the majority of legumes and leafy green vegetables were purchased as opposed to being homegrown.

Methods of storage of dried legumes was found to be quite variable with polythene bags or sacks being the most common storage methods. Green leafy vegetables were most frequently dried and stored in baskets for only a few days.

Bread was found to be a very popular breakfast food, but the use of rice was shown to be on the decline due to increasing costs.

Attitudes toward legumes were found to be positive with nutritive value, good taste and satisfying qualities most frequently listed as reasons for the liking of legumes. Reasons for not liking them included gas production in cowpeas, and difficulty of chewing and causing a cough in bambara nuts and groundnuts. Nutritive value and satisfying qualities were also found to be the main reasons for serving leafy green vegetables, with unavailability and lack of cooking knowledge the reasons for not serving them.

No foods other than the usual foods prepared daily in the villages were listed as special foods taken by pregnant and lactating women. The majority of the children in both villages were found to be weaned between the ages of one and two years, and most of them received a typical adult diet as soon as breast feeding was terminated.

Intake of protein and calcium at the evening meal was found to be low, according to FAO recommendations for specific groups.

A very positive response toward increased production of legumes and leafy green vegetables was found in both villages, indicating a possible good cooperation in the Home Extension Unit project.

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APPENDIX

HOUSEHOLD FOOD CONSUMPTION QUESTIONNAIRE

PART A: Information on Household Members

Village name:

Date:

Name of head of household: Sex: M____ F____

Total number of people in the household:

Name of interviewer:

Table 1 - Household Composition and Occupation of Members

Name	Age	Sex	Education					Occupation	
			N	P	M	S	H	M	S

Education

N: none

P: primary

M: middle

S: secondary

H: higher (specify)

Occupation

M: main

S: secondary

P: purchased

H: homegrown

PART B: Meal Patterns and Preparation of Individual Dishes

Table II - The Use of Whole Legumes

Name of Legume	Origin P	Origin H	Times Used/Week 0	Times Used/Week 1-4	Times Used/Week 5-9	Method of Preparation	Method of Storage	Length of Storage Time	Meals Used For B	L	S	Sn
Cowpeas												
Groundnuts												
Others												

Table III - The Use of Legume Flour

Name of Legume	Origin P	Origin H	Times Used/Week 0	Times Used/Week 1-4	Times Used/Week 5-9	Method of Preparation	Method of Storage	Length of Storage Time	Meals Used For B	L	S	Sn
Cowpea flour												
Groundnut paste												
Others												

Table IV - The Use of Green Leafy Vegetables

Name of Vegetable	Origin P	Origin H	Times Used/Week 0	Times Used/Week 1-4	Times Used/Week 5-9	Method of Preparation	Method of Storage	Length of Storage Time	Meals Used For B	Meals Used For L	Meals Used For S	Meals Used For Sn
Nkontomire												
Aleefu												
Shakpa												
Bokoboko												
Duadebaa												
Atomobaa												

Table V - The Use of Special Foods

Name of Food	Origin P	Origin H	Times Used/Week 0	Times Used/Week 1-4	Times Used/Week 5-9	Method of Preparation	Method of Storage	Length of Storage Time	Meals Used For B	Meals Used For L	Meals Used For S	Meals Used For Sn
Bread												
Rice												
Sugar												
Foods Purchased from Food Sellers												

1. Do you generally prepare special foods for pregnant women?

   Yes ( ) No ( )

   If yes, what are they?

2. Do you generally prepare special foods for lactating women?

   Yes ( ) No ( )

   If yes, what are they?

3. How old was your last child when you stopped breast feeding?

4. Which weaning foods did you use for this child?

PART C: Food Consumption

Table VI - Daily Household Food Consumption Record

Day: I	Menu	Ingredients	Quantities	Origin P	Origin H
Morning meal					
Noon meal					
Evening meal					
Snacks					

Purchase of the day		Left over foods
Food	Amount	Not used:
		Kept for later:

Day: II	Menu	Ingredients	Quantities	Origin P	Origin H
Morning meal					
Noon meal					
Evening meal					
Snacks					

Purchase of the day		Left over foods
Food	Amount	Not used:
		Kept for later:

Day: III	Menu	Ingredients	Quantities	Origin P	Origin H
Morning meal					
Noon meal					
Evening meal					
Snacks					

Purchase of the day

Food	Amount

Left over foods

Not used:

Kept for later:

Table VII - Attendance at Meals

Attendant	Sex	Age	Day 1 B	Day 1 L	Day 1 S	Day 2 B	Day 2 L	Day 2 S	Day 3 B	Day 3 L	Day 3 S

Code: X - meal had at home
E - meal taken in another home
O - no meal taken
OF - meal taken at farm or from food seller

Table VIII - Sharing and Distribution of Food

	Number of people sharing plate	Composition of People Sharing Plate M	F	Adult	Adol 11-18	Child	Amount of Food on Plate
Day 1							
Day 2							
Day 3							

PART D: Attitude Towards Specific Food Items

1. Attitude towards green leafy vegetables

Vegetable Name	Like	Indifferent	Dislike	Unknown
A. Nkontomire				
B. Aleefu				
C. Shakpa				
D. Bokoboko				
E. Duadebaa				
F. Atomobaa				
G. Others				

What are your reasons for serving these vegetables?

	A	B	C	D	E	F	G
1. availability	( )	( )	( )	( )	( )	( )	( )
2. cost	( )	( )	( )	( )	( )	( )	( )
3. nutritive value	( )	( )	( )	( )	( )	( )	( )
4. ease of cooking	( )	( )	( )	( )	( )	( )	( )
5. flavor	( )	( )	( )	( )	( )	( )	( )
6. color	( )	( )	( )	( )	( )	( )	( )
7. satisfying qualities	( )	( )	( )	( )	( )	( )	( )
8. others (specify)	( )	( )	( )	( )	( )	( )	( )

What are your reasons for not serving these vegetables?

1. non availability	( )	( )	( )	( )	( )	( )	( )
2. cost	( )	( )	( )	( )	( )	( )	( )
3. difficulty of cooking	( )	( )	( )	( )	( )	( )	( )
4. lack of cooking knowledge	( )	( )	( )	( )	( )	( )	( )
5. difficulty of storage	( )	( )	( )	( )	( )	( )	( )
6. beliefs	( )	( )	( )	( )	( )	( )	( )
7. others (specify)	( )	( )	( )	( )	( )	( )	( )

2. Attitude towards legumes

Legume Name	Like	Indifferent	Dislike	Unknown
A. Cowpeas				
B. Groundnuts				
C. Others				

What are your reasons for serving these legumes?

	A	B	C
1. nutritive value	( )	( )	( )
2. easy to prepare	( )	( )	( )
3. economical	( )	( )	( )
4. good taste	( )	( )	( )
5. satisfying quality	( )	( )	( )
6. others (specify)	( )	( )	( )

What are your reasons for not serving these legumes?

1. contains too many weevils	( )	( )	( )
2. takes too long to cook	( )	( )	( )
3. strange taste	( )	( )	( )
4. beliefs	( )	( )	( )
5. produces gas	( )	( )	( )
6. color	( )	( )	( )
7. others (specify)	( )	( )	( )

3. Do you have any land that is not being used?

Yes ( ) No ( )

Do you believe that you could put more of your land into vegetables and legumes?

Yes ( ) No ( )