ADOPTION OF SOYABEAN UTILIZATION INNOVATIONS AMONG WOMEN IN SAMARU VILLAGE OF SABON-GARI LOCAL GOVERNMENT AREA OF KADUNA STATE.

BY

TALE DADA AJIA (MISS)

A THESIS SUBMITTED TO:

THE DEPARTMENT OF AGRICULTURAL ECONOMICS AND RURAL SOCIOLOGY,
FACULTY OF AGRICULTURE, AHMADU BELLO UNIVERSITY, ZARIA,
NIGERIA

AS PART OF THE REQUIREMENTS FOR THE AWARD OF MASTER OF SCIENCE DEGREE (AGRIC, EXTENSION AND RURAL SOCIOLOGY)

1992

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CERTIFICATION

This thesis entitled: "The Adoption of Soybean Utilization Innovations Among Women in Samaru Village of Sabon-Gari Local Government Area of Kaduna State" by Tale D. Ajia ~~is~~ meets the regulations governing the degree of Master of Science of Ahmadu Bello University, Zaria, and is approved for its contribution to scientific knowledge of literary presentation.

.....
Dr. T.K. Atala
Chairman, Supervision Committee

2-8-93
.....
Date

.....
Dr. S.A. Ogunwale
Member, Supervising Committee

23-3-94
.....
Date

.....
Prof. L.A. Ega
Head, Dept. of Agricultural
Economics and R/Sociology

13/04/94
.....
Date

.....
Dean, Postgraduate School, ABU

6/4/94
.....
Date

DEDICATION

Dedicated to God and my beloved parents, Mr. Adeyemi Ambrose Ajia and Mrs. Maria Yetunde Ajia.

ACKNOWLEDGEMENTS

The completion of this study provides an opportunity for me to thank some of the wonderful people who have provided assistance, guidance and encouragement in various ways towards my educational development especially during my M.Sc programme.

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ABSTRACT

This study was designed to evaluate women's awareness and adoption of recommended soyabean utilization innovations and the factors affecting the adoption of the innovations. Data were collected through the use of structured interview schedule administered to 150 randomly selected women in Samaru village of Sabon Gari Local Government Area of Kaduna State.

The data collected were analysed using descriptive and inferential statistical tools. The results revealed that knowledge level of soyabean utilization innovations was relatively high, as about 82 percent of the respondents knew 10 or more of the 20 recommended uses of soyabean. Adoption score was, however, low as only 24 percent of the respondents adopted 10 or more of the recommended uses. Soya pap had the highest adoption by 79 percent of the respondents followed by soya vegetable soup by 78 percent of the respondents and soya milk by 7l| percent of the respondents. Utilization innovations that were not adopted at all were soya kakro, soya amala, soya dakuwa, soya danwake, soya gari and soya wain a.

Regression analysis showed that the variable most highly predictive of awareness was membership of associations followed by level of formal education and source of information, while the least predictive variable was household size, followed by income and age. The most important variable for adoption of utilization of soyabean was awareness followed by formal education and sources of information, while the least

important variable was age followed by literacy and income.

Finally if women are to adopt recommended soyabean uses, concerted efforts should be geared towards teaching them relevant skills in processing and preserving methods. These, of course, could be achieved through effective delivery of extension service, to women in their various ethnic, religious or social groupings.

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CHAPTER I: INTRODUCTION

Before independence, Nigeria was not only self-sufficient in food supply but also produced surpluses of agricultural raw materials such as cocoa, coffee, groundnuts, cotton and palm products for exportation to other countries. Agriculture at that time not only provided the Nigerian population with most of her foreign exchange needs with which the country financed her capital development but also with her food requirement (Amali, 1989). Of course, things have changed; thirty years after independence, Nigeria can no longer produce enough food for her fast-growing population.

Generally, food supply seems to have lagged behind food demand in many developing countries. A survey carried out by the Food and Agriculture Organization in 1975 indicated that during 1952-72, food production lagged behind population growth in 34 of 88 countries (FAO, 1975). For instance, the average annual growth rate of food production of 2.96 percent in Nigeria could not keep pace with the domestic demand for food put at 5 percent (Mustapha, 1990).

The problems of food supply and demand are not limited to quantitative considerations, there are also the qualitative aspects. Of great concern in the Nigerian case, however, is the dominating importance of cereal (mainly rice, millet, maize and sorghum) in the provision of protein. But cereal proteins are deficient in several

This study therefore examined the extent of awareness and adoption of uses of soyabean in Samaru village of Sabon-Gari Local Government Area of Kaduna State and the major factors that influenced these. The two basic research questions which this study answered were:

1. What are the levels of awareness and adoption of recommended uses of soyabean among women in Samaru village?
2. What are the main factors that influence awareness and adoption of recommended uses of soyabean?

Objectives of the Study

The broad objective of this study was to assess the level of awareness and adoption of recommended uses of soyabean among women in Samaru Village.

The specific objectives of the study were:

1. to determine the extent to which women were aware of recommended soyabean uses;
2. to determine the extent to which women had adopted recommended soyabean uses;
3. to determine the factors that affected women's awareness and adoption of recommended soyabean uses; and
4. on the basis of these findings, to make recommendations as to how the process of adoption of recommended soyabean uses could be accelerated.

amino acids that are required for proper nutrition (Ossai, 1987). The average Nigerian consumes about 46.7gm of protein of which only 6.5gm is from animal sources and 40.3gm from plants with legumes supplying 34.3gm (Marquis, 1984).

The main staple food items in Nigeria are the grains - rice, sorghum, millet and maize, and the tubers - cassava and yams. The protein content of these are low and in the face of insufficient animal protein in the diet a good plant protein substitute is imperative. Cowpeas have largely served this need in the Nigerian diet. Protective foods like fish, meat, eggs and milk containing high biological value proteins are virtually out of reach of the masses. How then could supplies of protein be augmented within the limited economic resources of the masses?

Soyabean appears to be the right solution to this problem of nutrition. The crop which has been described as miracle bean has about 40 percent quality protein, 21 percent unsaturated oil, 30 percent carbohydrates, and 10 percent minerals. It is important in improving the menu of malnourished children, and revitalizing heart and breast caner patients. Also faced with skyrocketing costs of meat, fish, eggs and other traditional sources of protein, soyabean offers a veritable alternative.

Most legumes contain 20-25 percent protein which is two or three times the protein value of most cereal grains. The cowpea that is very common in Nigerian dishes is easily infected by insects which reduce the nutritional

value and also the amount of the cowpea available for consumption. Since cowpea is relatively expensive and since the generally high cost of living in recent years might have reduced the real income of most low-income families, it is plausible to infer that there might have been a shift in the consumption pattern of some low-income households in favour of less expensive legumes like soyabean, which can also be put to various uses. Coupled with increased tempo of research and extension efforts, the popularity of soyabean has increased tremendously in recent time.

Statement of the Problem

Research institutes and other organizations in Nigeria have undetaken research activities in the application of soyabean in Nigerian diet. The studies done on uses of soyabean in the past three decades include those by Ashaye et al (1975), Eka and Edijala (1966), Faryna (1978) and Ossai (1987). However, the emphasis of these studies were on production and utilization trials of soyabean. Extension agents have also introduced the uses of soyabean to the public, but little attention has been paid to the rate of adoption of these uses of soyabean by the general public. Therefore, there is not much information as to the extent to which women are adopting the uses of soyabean.

Hypotheses

The following hypotheses were tested in the studies:

1. Socio-economic characteristics (income, social participation, source of information, age, literacy, Household size) of women and institutional factors (Extension visit and formal education) are significantly related to women's awareness of soyabean uses.
2. Socio-economic characteristics of women and institutional factors are significantly related to the adoption of soyabean uses.

Justification of the study

Current emphasis on the enlightenment of women through the Better Life Programme has done a lot to make women aware of recent innovations in agriculture, particularly, the uses of soyabean which has a high nutritional and economic value. However, not much has been done in the area of determining the extent of awareness and adoption among women. If the extension agents and government policy makers know the extent of awareness and adoption and understand the factors affecting adption of soyabean uses, such knowledge could be utilized in designing a social change programme aimed at fostering widespread acceptance of soyabean uses among women.

Even though extension agents cannot alter the socio-economic characteristics of the women, knowledge of the relationship between these socio-economic factors and adoption would be helpful to both the extension agents and government policy makers in formulating effective educational soyabean utilization programmes. Identification of socio-

CHAPTER II: LITERATURE REVIEW

Factors Affecting Adoption of Agricultural Innovations

Interest in diffusion and adoption research on agricultural innovation started over half a century ago, mostly in U.S.A. by rural sociologists. They focused their research efforts mostly on the relationships which exist between farmers' personal characteristics and their farming methods and practices. According to Rogers and Svenning (1969) most of the early diffusion and adoption studies in developing countries were conducted in Columbia, Brazil, Pakistan, India and Nigeria in the early 1960s. For example, one of the earliest diffusion and adoption studies in Nigeria, directed by E.M. Rogers, was conducted between 1964 and 1966 (Rogers and Solo, 1972). This study found positive relationships between socio-economic development of a village, degree of communication integration, change agent contact, individual characteristics and the success of village programmes in agricultural change.

Communication plays an important role in the adoption process. Before a farmer adopts a practice, he or she must be made to be aware of it through communication channels like radio, television and personal contacts with change agents or other farmers. Some existing studies of sources of information on farm practices in Nigeria show the importance of radio in disseminating agricultural information to farmers. For example, in a study of sources of agricultural

economic characteristics of the women and their relationship to adoption of soyabean uses is intended to serve both extension specialists and policy makers as analytical frame of reference in planning, implementing and evaluating current and future adoption of recommended soyabean uses.

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information available to farmers in former Western State of Nigeria, Williams (1969) found that three main sources of farm information were used regularly and frequently by 76 percent of the farmers interviewed. Out of these, agricultural extension workers accounted for 32 percent of the respondents, radio came second with 29 percent of the respondents while 15 percent of the respondents attributed the information received from fellow farmers. Another similar study by Yazidu (1973) revealed that radio was considered the most important source of information by 47 percent of the 613 farmers he interviewed in his study. The radio was followed by extension workers mentioned by 20 percent of the farmers, friends and neighbours were mentioned by 15.3 percent of the farmers. Similarly, Kidd (1968) in a study in Western Nigeria showed that 57 percent of the farmers studied indicated radio as the most important sources of improved agricultural innovation. Similar studies that confirm the importance of radio as the most effective medium for disseminating agricultural information among rural communities in Nigeria include those by Obibuaku (1966), Voh (1979), Arokoyo (1981) and Monu and Omole (1982).

The relationship between socio-economic conditions of farmers and their level of innovativeness is an important area of adoption research. Studies in this area have found that education, size of farm, contact with extension agents and socio-economic status are of significant importance to the adoption of farm practices (Lionberger, 1960;

Rogers, 1962 and Jones, 1967). Van den Ban (1957) reported in his study of characteristics of progressive farmers in Netherlands that farmers were young, recipients of vocational training in agriculture, members of farmers' organization and modern in their mode of living.

The relationship between socio-economic characteristics of farmers and their level of adoption of agricultural innovations appears to be one of the most important areas of diffusion and adoption research in Nigeria. In a study of recommended farm practices in the old Western state of Nigeria, Basu (1969) found that there were clear significant relationships between what he called situational factors - occupation, size of farm, tenure status and extension agent contact and level of adoption of recommended farm practices. It was found that among farmers, adoption was significantly correlated with level of formal education, use of mass communication media, size of farm, frequency of agents' contact and participation in organizations. Alao (1971) also found family size, exposure of mass media, participation in voluntary organizations, cosmopoliteness, farm size and level of awareness to be positively and significantly associated with farmers' adoption. Other similar stuies (Akiwowo, Akinola and Basu, 1969; Ogionwo, 1972; Voh, 1979; Atala, 1980, Opare, 1980 and Arokoyo, 1981) showed that personal and socio-economic variables are positively associated with level of adoption of agricultural innovations.

Socio-psychological factors associated with adoption appear to be of much importance too. Ogionwo (1979) ascertained that socio-psychological factors such as personal beliefs and familism played a vital role in adoption behaviour. Voh and Atala (1982), observed in their study of knowledge and use of recommended sorghum practices by farmers in Gusau Agricultural Development Project area that two agronomic practices (thinning and spacing between hole) were not adopted because they conflicted with traditional practices of the farmers.

The role of characteristics of innovation has been studied by many researchers. Lionberger (1960) while studying the characteristics of innovation and their effect on adoption and non-adoption of improved agricultural practices found that complexity of the practice was associated with change in existing practice. Abalu and Yayock (1980) examined the reasons behind low rates of adoption of improved technology in Northern Nigeria and concluded that low rates of adoption observed did not necessarily reflect innate undersirable psychological characteristics of small farmers. Rather, they probably reflected the inappropriate ness of the technologies being recommended and the limited access most serious farmers had to these technologies.

Monu and Omole (1982) in their study of adoption of selected number of recommended farm practices among a sample of cocoa farmers in Oyo state stated that the profit to the farmers on adopting the innovation was found to be very crucial in explaining differential adoption.

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Rogers (1962) emphasized five characteristics of an innovation and maintained that it is the perception of such characteristics by individuals in a social system that affect its rate of adoption. Those characteristics are "relative advantage", "complexity", divisibility", "compatibility" and "communicability".

It has been observed and demonstrated (Rogers and Shoemaker, 1971) that the more widely an individual has travelled, the higher the probability that he got exposed to various types of new ideas. Hence, early adopters tend to be cosmopolite, have more contacts with change agents, higher knowledge of new ideas and greater creditability with change agents than later adopters. Other antecedent factors to innovativeness according to Rogers and Shoemaker included leadership and social participation.

Origin and Spread of Soyabean

Soyabean (Glycine max (L) Merill) is one of the oldest cultivated crops whose history has been lost in antiquity. Wild variety of soyabean originated in Asia as far back as 2838 B.C (Norman, 1978). Although the existence of this highly nutritious crop was observed in Europe about 17th century and in U.S.A. in early 19th century little or no attention was given to the crop until the latter part of the 19th century when a number of experimental stations in U.S.A. and other countries in Asia started work on it.

Soyabean was introduced to Nigeria in 1908 (Ezedinma, 1961). Cultivation was restricted to 3 major growing areas, namely; Benue state, Abuja and Zonkwa-Kafanchan axis of Kaduna state. The limitation of soyabean production to these areas only was due to biological reasons (Ezedinma, 1961).

Concern of some soyabean scientists in Nigeria to find quick solutions to the problems that were limiting soyabean production in the country led to the initiation in 1980 of the National Soyabean Improvement Cooperative Trials by scientists from Institute of Agricultural Research and Training (IAR & T.), Institute for Agricultural Research (I.A.R.), National Cereals Research Institute (N.C.R.I.) and International Institute of Tropical Agriculture (IITA). The activities of the scientists instantly brought soyabean into national limelight which attracted the Federal Government's attention to the crop resulting in the inclusion of soyabean in the Nationally Coordinated Research Projects (NCRPs) by the Federal Ministry of Science and Technology in 1982 (Oyekan, 1983).

The NCRPs have produced new soyabean varieties that are agronomically superior to the Malayan variety. These varieties have high adaptability which make them suitable for cultivation in about 13 states, namely Anambra, Bauchi, Bendel, Benue, Gongola, Imo, Kaduna, Kwara, Niger, Ogun, Ondo, Oyo and Plateau (Oyekan, 1983).

Nutritional Value of Soyabean

Soyabean is an excellent source of protein both in quantitative and qualitative sense. Comparing the protein value of soyabean with cowpea; about 35-40 percent of the total dry matter content of soyabean is protein, whereas cowpea contains only 23 to 24 percent (Table 1).

Soyabean also has a higher total digestible nutrients percentage (91.9%) than cowpea (79.5%) and therefore is a better source of energy (Onochie, 1965) soyabean contributes approximately 20 percent fat to the diet. Soyabean fats is the unsaturated type unlike the saturated fats in animal proteins and hence is suitable for heart disease patients. As shown in Table 1 it contains approximately three times more calcium than cowpea. Both of these legumes are good sources of iron, thiamine, riboflavin and niacin.

Also, the amino acid distribution of soyabean protein (Table 2) is close to the distribution of hen's egg protein which is used as a reference protein for adult person by the F.A.O. However, all legumes including soyabean have a higher content of lysine than all other sources of plant protein (Onochie, 1965). The lysine soyabean even exceeds that of hen's egg protein.

Table 1: Comparison of soyabean and cowpea in 100g edible portion.

Food and description	Water g	Energy KCal	Protein g	Fat g	Carbohydrate g	Fibre g	Calcium 0g	Iron 0g	Vitamin A R.E	Thiomine 0g	Riboflavin 0g	Niacin 0g	Vitamin C 0g
Soyabean													
Whole seed dry	8.0	335	38.0	18.0	31.3	5.7	208	6.5	15	1.03	0.30	2.1	0
Bkacjeye peas													
Cowpea whole seed dry	10.5	431	24.1	1.2	53.7	4.7	77	7.2	5	0.87	0.23	1.9	3

Source: Faryna (1978): Soyabean in Nigerian Diet, Extension Bulletin No. 21, Home Economic Series No. 1.

Table 2: Amino Acid Patterns for Soyabean and Hen's egg protein (Mg/g Total Essential Amino Acid)

Amino-Acids	Soyabean Flour	Egg Protein
Lysine	161	125
Total Sulphur Amino Acids	74	107
Methionine-sulphur amino acid	37	61
Cystine-sulphur amino acid	37	46
Tryptophan	30	31
Threonine	101	99
Isoleucine	119	129
Phenylolanine	117	114
Leucine	181	172
Valine	126	141
Tyrosine	91	81
Protein score*	68	100

*Based on total sulphur containing amino acids.

Source: Faryna (1978), Soyabean in Nigerian Diet, Extension Bulletin No. 21, Home Economic Series No. 1.

Bean (1966) has estimated that 0.4 hectare of soyabean will provide enough protein to sustain a moderately active adult person for 2,224 days. This figure may be compared with 877 days of protein requirement produced by 0.4 hectare of wheat or the 354 days from maize. Even the latter value is considerably higher than the 77 days supply of protein which would be derived from 0.4 hectare of land used to support beef cattle.

Utilization of Soyabean

Traditionally, soyabean has not become popular in Nigerian diet because it is very difficult to cook in traditional Nigerian way and it lacks the familiar taste. Onochie (1965) noted that its use for the common "bean" recipes in Nigeria, such as Olele, Akara and other Soy-based foods is limited by its poor soaking and cooking qualities, lack of palatability and change of colour during cooking which renders it unattractive. For these reasons, most of the soyabean produced in Nigeria was exported as cash crop, except for little that was used for human consumption in some parts of the Northern states. Yuwa (1964) stated that Gwarin Genge around Diko in Niger state has been using soyabean for making spices (daddawa) for soup. Also, women in some parts of southern Kaduna used soyabean for making spices in place of locust bean. The Koros around Ija pound soyabean into powder and use it in place of melon seed to thicken their soup. In Benue state, soyabean is a kind of staple food consumed in a similar manner to cowpea, by cooking in water.

The uses of soyabean appear more varied than most other crops. Soyabean cake/meal and soyabean oil are the major important protein concentrates particularly in Nigeria where local consumption of vegetable oil has increased and the livestock sector especially the poultry industry, has been expanding rapidly. The caked meal serves as feeding stuff

(protein concentrates) to livestock, while the oil is consumed locally. The oil is also employed in the industrial manufacture of skin lotions, margarine, salad oil, cooking oil, etc. Lecithin, a by-product from the oil is used for bread baking. Because of its low starch context, soyabean flour has found a place as an excellent diabetic food. It serves as good substitute to locust bean in local preparation of spiees ("Daddawa", "Ogiri", or "Iru"). When ground, the paste could be a good substitute to melon seed for the preparation of vegetable soup. It is often used locally as supplement to improve the protein quality in the preparation of local foods like pap, porridge, soup, soya-tuwo, soya-gari, soya-amala, soya pancake, soya puff-puff. It is also added to cowpea to make "Olele" and "Kosai". It could also be used for milk for weaning children and milk for pre-school children, adolescent and adults. It is useful as herbage when fed to stock (fresh or dry) in form of silage or hay. It has high disgestible nutrient percentage and serves as a cheap source of protein compared with meat and cowpea. For women to meet the protein requirement in their family diet, it is advisable that they adopt improved soyabean uses.

Research Work on Soyabean Uses

Research Institutes and other organizations in Nigeria have undertaken research activities in the application of soyabean in food. Early attempt by a commercial company to

introduce soyabean-based product as a meat replacer failed, due to its unattractiveness (Onyekwere and Koleoso, 1983). Some years ago, the Home Science Section of the Ahmadu Bello University prepared pastes from cooked soyabeans. After frying in oil, a produce similar to akara from cowpea paste was obtained and evaluated for acceptance. The consumer survey revealed that the taste was not different from that of cowpea (Onyekwere and Koleoso, 1983).

Research has also been carried out in the use of full fat soyabean flour in the protein fortification of local starchy food such as bread and biscuits. This was documented by FIIRO (Federal Institute of Industrial Research, Oshodi). Using a 10 percent level substitution in wheat bread flour, acceptable bread was obtained which was scored higher in protein content than regular bread, by trained panelists. A consumer survey revealed that the bread was liked for its heavy weight (Onyekwere and Koleoso, 1983).

Another outcome of research effort is FIIRO's high protein infant weaning food called soyaogi. Soyaogi is a maize-soya blend or guinea-corn-soya blend, suitably processed, flavoured and vitaminised, to give a product containing about 20 percent protein for infants. Also, FIIRO has used defeated soyabean grits to fortify gari (Onyekwere and Koleoso, 1983).

Nationally Coordinated Research Projects (NCRPs) on soyabean involving four research institute namely IAR & T, IAR, NCRI and IITA take keen interest in utilization of soyabean and cooperate fully with Home Economists in

participating institues in popularizing local uses of soyabean. The key components of soyabean utilization packages, from all the research institutions, that are common to Nigerian diets are: soya amala, soya bread, soya chicken, soya dokuwa, soya danwake, soya feed, soya gari, soya kakro, soya kosai, soya milk, soya olele, soya panke, soya puff-puff, soya spices for soup, soya tofu, soya tuwo, soya vegetable soup, soya waina and soya yoghurt.

NAERLS and IITA have published extension bulletins as well as produced radio programmes on soyabean uses. There are extension personnel from NAERLS that go to some health centres to teach women how to use soyabean for their children.

CHAPTER III: THEORETICAL FRAMEWORK

Social Change

Rogers (1969) defines social change as the process through which alteration occurs in the structure and function of a social system. Moore (1963) also defines social change as the alternations of goals, structure or processes in a social system. Zaltman and Duncan (1977) see social change as a process by which people influence one another through mutual inter-change of thoughts, feelings and reactions. Thus as far as human beings are always in contact with one another and there are such elements like materials and social structures to be diffused; change is inevitable (Liton, 1958).

Furthermore, scholars have opined that in any social system, people's reactions to change programme is influenced by certain forces, For instance, Lippit (1953) recognised three types of such forces, which are:

1. Change forces that motivate people to change by creating dissatisfaction with the status quo and favourable judgement of potential future situations.
2. Resistance forces, which motivate people to change, that arise from uncertainty of the unknown and inability to change, and
3. Optimising an extension education system that effectively relates these conditions and resources to each other, making them in a way that stimulates

innovations which progressively overcome achievement dispartities common to traditional agriculture.

Also, social interventions are always designed with certain goals or outcomes in view. Whether these goals are achieved or not would depend on changes that are noticed among the target group. In this regard, Reynolds (1970) suggests the following as indicators that could be used to judge the success or failure of such interventions.

1. Changes in knowledge and attitudes,
2. Mediating behaviour (e.g. information-seeking activities),
3. Changes in individual behaviour towards the programme activities (e.g. trial adoption), and
4. Resulting social indicators effect (e.g. indices of economic or general well-being of the recipients).

Cohen (1964) further observed that although such indicators may be noticed among clients, there is the need to consider other factors that facilitate or inhibit planned change programmes.

Researchers have clearly shown that awareness and adoption behaviour, are a function of a number of variables which can be grouped as socio-economic, socio-cultural and institutional. For instance, Atala (1980), Voh (1984), Ahmed (1984) and Akanya (1990) have found certain socio-economic characteristics such as household size, size of farm, income, age, consmpolitaness, formal education and socio-economic status to be related to adoption.

In the same way, farmers' response to improved farm practices has been attributed to institutional factors such as extension contact, credit, input delivery and land accessibility. Osuji (1983) noted that frequency of agent's contact and distance from the sources of information are factors which affect farmers' adoption or rejection of agricultural innovations.

The definitions of social change have revealed that factors that could interact to produce or maintain the status quo could be institutional or socio-economic characteristics of farmers.

This is to say that other than the claims of certain scholars that farmers' lack of response to agricultural change is mostly influenced by their lack of innovativeness, illiteracy and conservation, socio-economic and institutional factors but even non-adoption of agricultural innovations. Where planned change programmes are not technically feasible, economically viable and culturally compactible with farmers' circumstances, they are often rejected (Gana, 1975; William, 1978).

The Adoption Process

Social scientists have been very much interested in understanding and explaining the adoption and non-adoption of innovations. To this end, quite a number of adoption studies have been conducted both in the developed and developing nations of the world. There is no doubt

therefore that a voluminous body of literature now exist in the area of adoption of innovations.

The adoption-diffusion process according to Rogers and Shoemaker (1971) comprises four critical elements:

1. The innovation which is defined as an idea, a practice or a thing that is perceived as new by an individual.
2. Its communication through various channels.
3. Overtime and
4. Among members of a social system.

The adoption - decision process is a mental process through which an individual passes from knowledge of innovation to a decision to adopt or reject an innovation (Rogers and Shoemakers, 1971). This process occurs over a period of time and consists of a series of stages (Ryan and Gross, 1943; Wilkening, 1952; Beal and Bohlen, 1957). The number of stages involved in the adoption process as reported by researchers has been varied, however, the five stage model has been the most widely accepted. These stages are:

1. The Awareness Stage: in which individual's are exposed to new practice or technology.
2. The Interest Stage: whereby the individual forms a favourable attitude towards the innovation.
3. The Evaluation Stage: whereby the individual engages in activities which lead to a choice to adopt or reject an innovation.

4. Trial or Implementation Stage: is when the individual applies the new idea on a small-scale in order to determine its utility in his own situation, and
5. Adoption Stage: is the acceptance and continuous use of agricultural innovations by the individual. The individual could however reject the innovations in the face of better alternatives.

Also, since in any social system all individual do not adopt an innovation at the same time, social scientists have classified adopters into various categories based on the time when they first adopted the new idea. Each of these categories contains individuals with a relatively similar degree of innovativeness. The categories are:-

1. Innovators - There are those who are always eager to try new ideas. This interest leads them out of a local circle of peers and into a more cosmopolite social relationship. The major value of the innovator is venturesomeness.
2. Early adopters - These are localities, having more than any other adopter the greatest degree of opnion leadership in most social system. Potential adopters look to them for advice and information about the innovation while change agents also use them to speed the diffusion process.
3. The early majority: - These are those that adopt an innovation just after the early adopter. They follow with deliberate willingness in adopting innovation but seldom lead.

4. The late majority - These adopt an innovation just after the average members of a social system. They are skeptical about innovations, as such the weight of system norms must definitely favour the new idea before the late majority adopters are convinced.

5. The laggards - These are the last group to adopt an innovation. The point of reference for the laggards is the past. Decisions are usually made in favour of how things were done in previous generations. Thus, they often adopt an innovation when it might have been superceeded by a more recent idea.

It is however worth mentioning that the stages form basically a conceptual framework (which is neither true nor false) for organising the research data (Atala, 1980).

For the purpose of this study, therefore, certain socio-economic and institutional factors were selected for analysis in relation to women's awareness and adoption of soyabean utilization innovations. The selected socio-economic characteristics of women are level of education, age, household size, income, level of literacy and membership in associations, while the institutional variable is contact with extension. All these variables and their relationships are discussed below.

Discussion of Variables

The variables that are discussed below were selected on the basis of the literature reviewed, The variables are classified as "Independent" and "Dependent".

Independent Variables

Age: One important factor that is expected to inhibit or facilitate the effect of a social intervention in the society is age. Age is associated with status and role (Linton, 1942; Parson, 1961).

Voh (1979) and Atala (1980) in their various studies reported that adopters were younger than non-adopters of agricultural innovations. The older farmer's aversion to risk may reduce his or her motivation to participate in agricultural development programme. It is therefore expected that age tends to be related to awareness and adoption of recommended uses of soyabean.

Household Size: Household size is another variable that may be associated with the success or failure of adoption of recommended uses of soyabean by women. Atala (1980) observed that in rural communities of developing countries that size of a family is related to the socio-economic status of the household heads. It therefore means that larger families would be favourable towards recommended innovations. It is therefore expected that household size would be related to awareness and adoption of recommended uses of soyabean.

Level of Education: Several studies (Cattrell, 1942 and Lionberger, 1960) used level of education as a measure of status, people with more education tend to have higher status. The relevance of education to women could be seen in the opportunities that are opened to educated women to read and understand agricultural extension bulletins, posters and instructional materials. Nweke and Akohie (1982) observed that, this may provide a favourable atmosphere for awareness and acceptance of new recommended practices.

Lionberger (1960), Rogers (1962) and Galjart (1968) have found a positive relationship between awareness and acceptance of innovations. So level of education may be related to awareness and adoption of recommended uses of soyabean.

Social Participation: Nigerian farmers that participate actively in the life of their communities through membership and leadership of social organizations such as farmer's cooperative thrift and credit societies adopt innovations more than those who do not.

Membership in organizations is supported by the research findings of Clark and Akinbode (1968) and Alao (1974) on the adoption of maize, cocoa and improved practices in the Western part of Nigeria. They found farmers' membership of association to be positively related to farmers' adoption behaviour. It would therefore be assumed that membership in organizations would affect the adoption of soyabean uses.

Income: Almost all the studies of individual differnces to adoption behaviour showed that farmers with higher income are quicker in adopting modern practices than farmers with low income (Lionberger, 1960). On the basis of such research and other related findings one would expect that income would be related positively to adoption of methods of soyabean uses.

Literacy: Like formal education, literacy could be assumed to generate a favourable attitude towards the adoption of the soyabean uses. Various studies have established the importance of functional literacy in explaining the adoption of new agricultural ideas. Examples of these are the studies of Golden and Ralis (1957) in Thailand, [illegible] and Rogers and Herzog (1966) in Colombia. Generally, therefore, literacy will tend to be related to adoption of recommended uses of soyabean.

Extension Visits: A major concern of agricultural extension programmes is to transfer improved agricultural innovations to the farmers. Part of this effort includes visiting groups or individual women to show them how to carry out certain recommended uses of soyabean.

Several studies have shown that extension agents serve as effective channel through which information are passed to farmers (D'Silva and Raza, 1980). Similarly, Williams (1970) found that face to face visits were the most effective means of reaching the farmers by the extension agent.

Edache (1978) and Voh (1979) found a positively significant relationship between the frequency of extension agents' visit and the adoption of improved farm practices. Therefore, extension visit is expected to be positively related to women's awareness and adoption of soyabean utilization innovations.

Dependent Variables

Awareness: Awareness is defined as the knowledge of the existence of an innovation. It is seen as the first stage in adoption process (Rogers and Shoemaker, 1971). It is expected that through extension, women would get to know of latest soyabean innovations. It is expected that awareness may be related either negatively or positively to some selected institutional and socio-economic variable.

Adoption: Adoption is defined as the acceptance and continuous use of innovations. In this study, soyabean uses refer to the following twenty selected soyabean uses which are the same as independent variables:

1. Soya amala
2. Soya bread
3. Soya chin-chin
4. Soya dakuwa
5. Soya danwake
6. Soya feed
7. Soya gari
8. Soya kakro
9. Soya kosai
10. Soya milk
11. Soya Olele
12. Soya panke
13. Soya pap
14. Soya puff-puff
15. Soya spices
16. Soya tofu
17. Soya tuwo
18. Soya vegetable soup
19. Soya waina
20. Soya yoghurt.

These are recommendations which emanated from Nationally Coordinated Research Projects (NCRPs) on soyabean and are being communicated to women by NAERLS, Zaria. The percentage of acceptance of innovations by individuals in a social system often differs. It is expected that adoption would be related to the selected socio-economic and institutional variables.

CHAPTER 1V: METHODOLOGY

Introduction

In this chapter, the objectives are to (1) describe the research setting, (2) sampling procedure and sample size, (3) method of data collection, (4) operational indices of variables and (5) data analysis.

Area of Study

The study area was Samaru village, Sabon-Gari Local Government Area of Kaduna State. Samaru village is about 20 kilometres from Zaria along Zaria-Sokoto highway. It is situated opposite Ahmadu Bello University, Zaria.

Samaru is located at Latitude $11^{o}11^{'}N$ and Longitude $07^{o}38^{'}E$ of the Prime Meridian. The climate is tropical continental with annual rainfall between 100 and 150 centimetres and dry period of between 4 to 6 months in a year.

There is relatively low relative humidity of between 20 and 40 percent in January, and between 60 and 80 percent in July. The mean annual temperature varies between $22^{o}C$ and $25^{o}C$. Samaru village falls within the Northern Guinea Savanna zone. Leached ferruginous tropical soils are mot common and have well developed textural B horizons which is 30 to 40 percent clay (Udo, 1970).

The main crops grown in Samaru area are sorghum, maize, millet, cotton, groundnuts, cowpea, yams, rice, sugar cane and soyabean. The inhabitants are mostly government workers, traders and private enterpreneurs.

Sampling Procedures and Sample Size

Samaru village was purposively selected for this study on the basis of the fact that two Agricultural organisations namely, the Institute for Agricultural Research (IAR) and the National Agricultural Extension and Research Liaison Services (NAERLS) should have had some impact on the people in the area. In Samaru village as it is the case with many modern villages and towns contains blocks of houses. A block is bounded on four sides by roads. Based on pre-survey visits, it was found that there were about 10 compounds in each "block". These blocks were given numbers from 1-56 and each number was written on a piece of paper. The pieces of paper were put in one container and mixed thoroughly. Then, thirty numbers representing thirty blocks were picked randomly without replacement. From the 30 blocks randomly selected, 5 compounds from each block were similarly chosen. From each compound one woman was randomly selected giving a total sample size of 150 respondents.

Methods of Data Collection

The data were collected between June - July 1991. Data collected were largely from primary sources. A structured interview schedule was used in collecting the data for this study. This was administered by the researcher and two enumerators.

Measurement of Variables

In this section, an attempt was made to define the variables investigated and to state how they were measured in the study. The independent variables considered are age, household size, level of formal education, level of literacy, income, social participation, contact with extension workers and exposure to various sources of information. The empirical measurements of the variables are described below:

Age: This was measured by the actual age given in years by the respondents during the time of the interview.

Household size: This was measured by adding up the total number of people that were actually living with the respondent at the time of data collection. The respondent's score was the total number of people in her household.

Level of Literacy: This was measured by scoring the respondent who could not read or write in any of the Nigerian major languages 0, those who could read or write in each of English, Hausa, Yoruba and Ibo language 1, those that could read or write in two languages 2, and so on.

Level of formal Education: This was measured by the number of years the respondent had spent in formal school system. The respondents' score was the total number of years spent in formal school.

Income: This was measured by the actual amount of money realized from economic activities and/or wages from the previous year.

Social Participation: This was measured by the number of associations the respondent belonged to.

Extension Visits: This was measured by the number of times the respondent was visited by extension agents and the number of times the respondents visited the extension agents in the previous year.

Exposure to Various Sources of Information: This was measured by adding up all the information sources used by the respondent. Each source mentioned was scored 1. These sources are friends and relatives, radio, television, posters and leaflets, voluntary organization, newspapers, extension workers, agricultural show, traders, films, slides, workshops and seminars.

Awareness: This was measured by adding up all the 20 selected innovations the respondent claimed knowledge of. Each innovation known was scored 1.

Dependent Variables

Awareness: This was measured by the number of soyabean utilization innovations a woman reported being aware of out of the selected 20 uses. These soyabean utilization innovations were soya amala, soya bread, soya chinchin,

soya dakuwa, soya danwake, soya feed, soya gari, soya kakro, soya kosai, soya milk, soya olele, soya panke, soya puff-puff, soya pap (ogi or akamu), soya spices for soup (daddawa, iru or ogiri), soya tofu, soya tuwo, soya vegetable soup, soya waina and soya yoghurt. Each of the innovations was given an equal weight. Each of the utilization the woman claimed knowledge of was scored one.

Adoption: This was measured by the number of recommended soyabean uses accepted and used by the respondent. The number of soyabean uses were listed above. Each of the uses was given an equal weight i.e. the number of recommended uses of soyabean by a respondent was the adoption score of the respondent.

Tools of Analysis

The data for this study were analysed with two sets of statistical tools namely, descriptive and inferential techniques. The descriptive statistics that were employed were frequencies and percentages. These were used to show women's awareness and adoption of soyabean utilization innovations. Inferential methods that were applied are multiple correlation and regression statistics. These were used to determine the relationship between women's socio-economic and institutional factors and their awareness and adoption of soyabean utilization innovations.

Correlation was used to measure association between variables. Correlation coefficient (r) gives the degree of association between any two variables under consideration.

Correlation coefficient varied from zero (no correlation) to $\pm$ 1 (perfect correlation). The coefficient (r) can be viewed as a measure of the ability to predict one variable (Y) from the knowledge of another variable (X) (Palumbo, 1977).

However, correlation by itself is not very meaningful (Cohen and Cohen, 1975). Even with a high coefficient (r) for variable x and y, one cannot infer that the variables are causally related. It may be that a third variable is related to both variables and produce change in both of them. To begin to tackle the problem of sorting out cause, one needs to use multiple regression analysis.

Multiple regression measures the combined effect of any number of independent variables on a dependent variable. The multiple regression formular may be written as (Palumbo, 1977):

$$Y = a + b_1x_1 + b_2x_2 \ldots\ldots b_nx_n + u$$

where Y = dependent variable

x_1 = represnts the first independent variable

x_2 = the second, independent variable

b's= represent regression coefficients

u = represents error

a = represents constant

n = represents the number of explanation variables.

The equation is linear because it assumed a constant rate of change for the relationship between each of the independent variables and the dependent variables.

Multiple regression analysis is a much more efficient method of analysing data than cross tabulation or simple

correlation analysis (Palumbo, 1977). This is because it allows us to:

a) determine the simultaneous impact of a number of variables on a single dependent variable,

b) find out the predictive accuracy of the independent variable considered,

c) determine the amount of variation in the dependent variable explained by each of the independent variables.

Also, the use of step-wise regression analysis gives us an idea of the relative importance of each of the independent variable. In step-wise regression the variables are entered one after the other. This exercise produce two measures, the coefficient of determination (R^2) of the degree of association between the dependent variable and all the independent variables jointly and the data weight (B). The data weight is taken as the relative percentage of variance accounted for by each of the independent variable. The R^2 is interpreted as the sum of the proportions of variation in the independent variables (Ezekiel and Fox, 1959).

In using correlation and regression analysis the assumptions are at:

1. the relationship in the population is linear
2. there is equal variance of the variables; that is homoscedasticity
3. Random sampling has been used
4. the errors (residual variance) are independent

5. variables are measured by interval scale.

Where a normal variable is used, however, a dummy variable is created by assigning arbitrary number such as zero and one to the categories of the norminal scale variable. The relationships between variables in this study were judged at 0.5 level of significance.

CHAPTER V: FINDINGS

Introduction

This chapter presents analyses of data in relation to the stated objectives in chapter one.

Awareness of Recommended uses of Soyabean: The first objective of this study was to determine the extent to which the women were aware of soyabean uses. Data on Table 3 show that 146 out of 150 women (97 percent) mentioned that they had heard about soyabean uses. The highest level of awareness was on soya milk which was mentioned by 144 women (96 percent); this was followed by soyabean vegetable soup mentioned by 140 women (93 percent); soya pap known by 137 women (91 percent) and soya spices mentioned by 130 women (87 percent). The three least known soyabean uses were soya kakro which was mentioned by 18 women (12 percent); soya amala, known by 17 women (11 percent); and soya dakuwa, known by 16 women (10.6 percent).

Over half (82 percent) of women were aware of 10 or more of the 20 uses of soyabean. This is an indication that there was a high level of awareness of soyabean uses among women.

Table 3: The extent of awareness of the recommended uses of soyabean in Samaru.

Soyabean use	Number of respondents aware of the use	Percentage
Soya milk	144	96
Soya vegetable soup	140	93
Soya pap (ogi or akamu)	137	91
Soya spices for soup	130	87
Animals and Poultry feed	123	82
Soya olele	118	79
Soya tofu	113	75
Soya kosai	110	73
Soya puff-puff	61	41
Soya chinchin	60	40
Soya panke	47	31
Soya bread	42	28
Soya tuwo	40	27
Soya yoghurt	36	24
Soya waina	29	19
Soya danwake	23	15
Soya gari	20	13
Soya kakro	18	12
Soya amala	17	11
Soya dakuwa	17	11

No of respondents = 150

Adoption of Recommended uses of Soyabean: The second objective was to determine the extent to which women adopted uses of soyabean. Table 4 shows that the highest level of adoption among the respondent was with respect to the use of soyabean for soya pap, which 79 percent of the women had adopted. This was followed by the use of soyabean for soup (78 percent), use of soyabean for spices (69 percent) and soya milk (74 percent). There was no respondent that adopted any of the following uses of soyabean; soya kakro, soya danwake, soya yoghurt, soya waina, soya amala and soya gari. These findings indicate that there was a relatively low degree of adoption of the 20 recommended soyabean uses among women.

Table 4: The extent of adoption of recommended soyabean uses in Samaru village.

Soyabean uses	No. of women who adopted	Percentage
Soya pap (ogi or akamu)	119	79
Soya vegetable soup	117	78
Soya milk	111	74
Soya spices for soup	103	69
Soya feed	101	67
Soya tofu (wara)	75	50
Soya olele	61	41
Soya chinchin	24	16
Soya kosai	15	10
Soya puff-puff	12	8
Soya yoghurt	8	5
Soya panke	6	3
Soya tuwo	2	1
Soya bread	2	1
Soya kakro	2	1
Soya danwake	0	0
Soya dakuwa	0	0
Soya waina	0	0
Soya amala	0	0
Soya gari	0	0

NO of respondents = 150

The results in Table 5 indicates that awareness of soyabean uses was relatively high while adoption of some soyabean uses were relatively low. This was especially the case with soyabean kosai which had 73 percent awareness and about 10 percent adoption and soyabean puff-puff which had 41 percent awareness and only about 8 percent adoption. The use of soya pap and soya vegetable soup seemed to be the two most important uses adopted by 79 percent and 78 percent of the respondents respectively.

Table 5: Distribution of respondents according to their awareness and adoption levels of soyabean uses.

Soyabean uses	% that knew	% that used	Difference (%)
Soya milk	96	74	22
Soya vegetable soup	93	78	15
Soya pap	91	79	12
Soya spices for soup	87	69	18
Soya feed	82	67	15
Soya olele	79	41	38
Soya tofu	75	50	35
Soya kosai	73	10	63
Soya puff-puff	41	8	33
Soya chin-chin	40	3	37
Soya panke	31	3	28
Soya bread	28	1	27
Soya tuwo	27	2	25
Soya yoghurt	24	5	19
Soya waina	19	0	19
Soya danwake	15	0	15
Soya gari	13	0	13
Soya amala	11	0	11
Soya dakuwa	11	0	11

No of respondents = 150

Determining the socio-economic and institutional factors that affect women's awareness and adoption of soyabean uses, was the third objective of this study. A step-wise regression analysis was used to determine the best combination of variables explaining the variance in the dependent variables.

The first hypothesis was that: Socio-economic characteristics of women and institutional factors are significantly related to women's awareness of recommended uses of soyabean. The results of the pearson correlation coefficient and step-wise regression analysis used to show the relationship between women's awareness of soyabean uses and their socio-economic and institutional factors are presented in Tables 6 and 7.

Table 6: Pearson Correlation Matrix of the variables

Variable	Age	Household Size	formal education	Literacy	Income	Social Participation	Information sources	Ext. visit	Awareness	Adoption
	x_1	x_2	x_3	x_4	x_5	x_6	x_7	x_8	x_9	x_{10}
Age	1.00									
Household size	0*.438	1.00								
Formal education	-*.451	-*.427	1.00							
Literacy	-*.453	-*.389	*.822	1.00						
Income	-*.258	-*.341	*.803	*.589	1.00					
Social participation	-*.406	-.123	*.322	*.338	*.232	1.00				
Information sources	-.262	-*.337	*.550	*.429	*.558	*.378	1.00			
Extension visit	-.185	-.135	.376	.352	.367	*.394	*.288	1.00		
Awareness	-*.229	-.146	*.604	*.413	*.232	*.445	*.347	*.293	1.00	
Adoption	-*.387	-.072	*.532	*.498	*.484	*.424	*.428	*.468	*.590	1.00

* Indicates significance at 5% level.

Table 7 shows that 6 out of 8 independent variables were found to be positively and significantly related to awareness at .05 level of significance. These variables are: formal education, literacy, income, social participation, information sources and extension visit. Age was found to be negatively significant to awareness. The only variables not found to be significantly related to awareness was household size. The hypothesis that there is a significant relationship between the socio-economic and institutional variables and awareness of soyabean uses was therefore supported.

Table 7: Pearson Correlation Coefficient of the relationships between selected variables and awareness of soyabean uses.

Variable	Coefficient (r)	Test Result
Formal education	.604	Significant
Social participation	.445	Significant
Literacy	.413	Significant
Information sources	.347	Significant
Extension visit	.293	Significant
Income	.232	Significant
Age	-.229	Significant
Household size	-.146	Not significant

The independent variables explained about 42 percent of the variance in awareness of soyabean uses (Table 8). Out of these variables, membership of association, level of formal education and source of information explained 37 percent of the variance.

Therefore, among the eight selected variables, membership of association was found to be the best predictor of awareness of soyabean uses. Age, income and household size made the least contribution to awareness of soyabean uses. This shows that the three variables may not be very critical in women's awareness of soyabean uses.

Table 8: Step-wise Regression Analysis of the relationship between women's individual factors and awareness of soyabean uses.

Variable	Awareness Coefficient of determination (R^2)	R^2 Change
Membership of association	0.18182	0.18182
Formal education	0.28345	0.10163
Source of information	0.36659	0.08314
Literacy	0.39034	0.02375
Extension visit	0.41235	0.02201
Age	0.42238	0.01003
Income	0.42265	0.00027
Household size	0.42268	0.00003

The second hypothesis was that: Socio-economic characteristics of women and institutional factors are significantly related to the adoption of soyabean uses. The findings in Table 9 showed that 7 out of the 9 variables were positively and significantly related to women's adoption of soyabean uses at the required level of significance. These variables are: formal education, literacy, income, social participation, awareness, sources of information and extension visits.

Age was negatively significant while household size was not significant at all.

Therefore, the hypothesis that there is a relationship between socio-economic and institutional factors and adoption of soyabean uses was supported.

Table 9: Pearson Correlation Coefficient of the relationships between selected variables and adoption of soyabean uses.

Variable	Coefficient (r)	Test Result
Age	-.387	Significant
Household size	-.072	Not significant
Formal education	.532	Significant
Literacy	.498	Significant
Income	.484	Significant
Social participation	.424	Significant
Awareness	.590	Significant
Sources of information	.428	Significant
Extension visit	.468	Significant

The results of the step-wise regression analysis in Table 10 shows that independent variables accounted for 40 percent of the variance in the adoption of soyabean uses. Three of the variables, awareness, formal education and sources of information explained 38 percent of the variance. Two others, extension visit and social participation explained 2 percent of the variance in women's adoption of soyabean uses.

Table 10: Step-wise Regression Analysis on adoption of soyabean uses innovations and women individual characteristics.

Variable	Multiple R.	R. Squared	R. Squared Change
Individual's awareness	.53193	.28295	.28295
Formal education	.58486	.34206	.05911
Sources of information	.60394	.38474	.04268
Extension visit	.61265	.39434	.01060
Social participation	.62065	.40594	.01017
Household size	.62879	.41611	.00455
Income	.63634	.42066	.00466
Literacy	.63999	.42269	.00203
Age	.64327	.42680	.00421

The best predictor of adoption was awareness. Literacy made the least contribution to the percentage of variance in adoption of soyabean uses. Thus, it can be concluded that individual's awareness might be very critical in women's adoption of soyabean uses.

CHAPTER VI:

DISCUSSION OF FINDING, SUMMARY, CONCLUSION AND RECOMMENDATION

Introduction

In this chapter the results of the study findings, conclusion and recommendations are presented.

Women's Awareness of Recommended Uses of Soyabean.

The first objective of the study was to determine the extent to which the women were aware of soyabean uses. The findings showed that there was a high level of awareness of soyabean uses among women. For instance, over 82 percent of women were aware of 10 or more of the 20 uses of soyabean. This finding is consistent with the results obtained by Zaria (1984), Akanya (1989) and Akanya (1990) whereby the awareness of recommended farm practices among farmers was over 80 percent in each case. This could be due to the activities of the I.A.R. and NAERLS in the study area.

Assessment of the Extent of Adoption

The second objective of this study was to determine the extent to which the women adopted uses of soyabean. The findings revealed that there was a relatively low degree of adoption of all the 20 recommended soyabean uses among women. For example, only about 24 percent of the women adopted 10 or more of these uses.

Data on awareness and adoption therefore show that there was a substantial gap between awareness and adoption. The studies by Atala (1980), Arokoyo (1981) and Akanya (1990),

lend support to this finding. The issue of that awareness can certainly help in raising women's aspirations and motivations towards acquisitions of new technology, but, awareness alone cannot provide the means for adoption of the new technology. Besides, an individual does not usually adopt a new idea at the moment he/she first learns about it. Adoption is a process involving many stages and not a single act. Because of its complex nature, it takes some time, therefore, for people to go through the adoption decision stages (Bohlen, 1964).

The use of soya pap and soya vegetable soup seemed to be the two most important uses adopted. Other uses which were found to record a greater percentage of adoption by the women were in descending order of significance soya milk, soya spices, soya feed, soya tofu, soya olele and soya chinchin.

There was no respondent that adopted any of the following uses of soyabean; soya kakro, soya danwake, soya yoghurt, soya waina, soya amala and soya gari. This may be because some of the respondents that were aware of these soyabean uses do not know the processing methods of the uses.

Factors that Affect soyabean uses innovations.

The third objective of this study was to determine the factors that affect soyabean use innovations. It has been observed that farmers' decision to either adopt certain innovations or not was influenced more by their socio-economic and institutional characteristics than by other factors (Agbonifo, 1974).

Variables that were found to be significantly related to adoption are in descending order of importance, awareness, formal education, literacy, income, extension visit, social participation and sources of information. Awareness was found to be the best predictor, explaining about 28 percent of the variation in adoption of soyabean uses. This might be expected because wareness is the first and crucial step in the adoption process. The positive and significant association between literacy and adoption suggests that literacy ability exposes women to various processes of soyabean uses. The positive and significant association between income and adoption might imply that as the women's income increase, their ability to spend more on soyabean uses increeases, i.e. they could afford to buy soyabean and try as many uses as they could.

Also, social participation was significantly related to adoption of soyabean uses. The case is that participation in voluntary social community organisations provide exposure to useful information and actual learning experiences. The finding on this variable is somewhat in support of other findings by Atala (1980), Arokoyo (1981) and Akanya (1990). The positive and significant association between extension visit and adoption of soyabean uses was not surprising because extension visit is critical in women's adoption of soyabean use innovations. Age was negatively significant to adoption. This result is in line with the research findings like Clark and Akinbode (1968), Alao (1971) and Atala (1980).

A possible explanation of the negative relationship might be the fact that elderly women are somewhat less inclined to change food preferences than the young women. The insignificant relationship between household size and adoption was inconsistent with the theoretical expectation stated earlier in this study. In the theoretical expectation stated it was expected that household will be significantly related to adoption. The possible explanation for the insignificant relationship between household and adoption could be due to the fact that most of the women in the study area were enlightened. They do not necessarily keep large households due to the monogamous nature of their families.

Eight out of the nine socio-economic and institutional variables were related to adoption of soyabean uses. It was therefore concluded that the hypothesis: "Socio-economic characteristics of the farmers and institutional factors are significantly related to adoption of soyabean use innovations" was supported.

Recommendations

Recommendations of this study was the fourth objective. Based on the findings of this research work, such recommendations are as follows:-

1. Given the observed wide gap between women's awareness and adoption of recommended soyabean uses, concerted effort should be made toward closing the gap. This can be done in a number of ways

including women in agriculture extension agents, teaching women relevant skills of processing soyabean uses, improving on the preservation method of the products so that it would not be time wasting, enlightening women on the nutritional value of soyabean compared to other crops.

2. The key constraints on adoption of soyabean uses were found to be lack of access to extension workers, difficulties in preserving the product and not having the technical knowledge of processing. The elimination of these problems would necessitate obtaining technical knowledge about processing and preservation of the products. Since extension workers are very few other means of delivering extension services should be exploited. Such means should include radio and television programmes. The extension agent could be meeting women in their ethnic, religious or social groups to demonstrate the uses of soyabean.

3. Since very little work has been done with respect to adoption of soyabean uses in Northern Nigeria, there is a need for this study to be replicated with larger samples in different ecological zones in the Northern states so that results can be compared meaningfully. It might be necessary that the study be carried out covering not only the socio-economic and institutional variables but also

the traditional beliefs, and environmental variables such as edaphic and climatic factors favourable to the processing and preservation of soyabean.

Summary.

The purpose of this study was to determine the awareness and adoption of recommended uses of soyabean and examine factors influencing women's adoption behaviour. The specific objectives were:-

1. to determine the extent to which women are aware of recommended soyabean uses,
2. to determine the extent to which women have adopted recommended soyabean uses,
3. to determine factors that affect women's adoption of recommended uses of soyabean, and
4. on the basis of the findings, to make recommendations on how the process of adoption of recommended soyabean uses can be accelerated.

The literature reviewed provided a framework from which theoretical relationship between independent and dependent variables were drawn. Also, two hypotheses were tested. These were that: there is significant correlation between socio-economic and institutional characteristics and awareness of recommended soyabean uses; and that there is a significant correlation between socio-economic and institutional characteristics and

adoption of recommended soyabean uses.

Data were collected through the use of structured interviewed schedule administered to 150 respondents who were randomly selected. The data were collected in the months of June and July 1991 and analysed using both the descriptive and inferential statistical techniques. The descriptive statistics used were percentages and feequences analyses while the inferential statistical tool employed were multiple correlation step-wise and regression.

The results showed that awareness was significantly related to adoption. The results also showed that most of the socio-economic and institutional variables were significantly related to adoption of recommended soyabean uses. The most significant variables for adoption, in descending order of importance were awareness, formal education, sources of information, extension visit and social participation. Age was negatively significant to adoption while household size was not significant at all. The best predictor of adoption of soyabean uses was awareness.

Conclusion.

This study that was conducted to determine the extent of awareness and adoption of soyabean use innovations has been able to validate the assertions of other researchers. The study showed that there was a high percentage of awareness among women of soyabean use innovations but the percentage of adoption was relatively low. This lag between awareness

and adoption may not be unconnected with the processes involved in getting women to adopt and the factors that may intervene in the process. The study however found out that the best predictor of adoption of soyabean uses was awareness.

The result further showed that some socio-economic and institutional factors such as formal education litracy level, social participation, extension visit and sources of information were positively and significantly related to awareness and adoption of soyabean use innovations. This therefore implies that the stated hypothesis that: "Socio-economic characteristics and institutional factors are related to awareness and adoption of soyabean use innovations" was supported.

In order to adopt the soyabean uses, women must not only be made aware of these uses but extension services should also provide effective educational learning experiences on soyabean uses in order to enhance the adoption of soyabean uses by women.

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APPENDIX

Interview Schedule

1. Name:.....
2. Age:.....
3. Ethnic Group:.....
4. Religion:.....

Socio-Economic Questions

Household

5. What is your marital status?.....
6. If married, are you the only wife? Yes or No:.....
7. If no, how many other wives has your husband?.....
8. How many are you altogether in your household?.....

Education

9. How many years do you have of:
   a) formal education:.....
   b) adult education:.....
   c) Koranic education:.....
   d) No education:.....
10. In which of the following languages can you read/write?
    a) Hausa (b) Yoruba (c) Arabic (d) Igbo (e) English.

Income

11. What is your major occupation:.....
12. Beside this major occupation which other occupation(s) do you have?.....
13. Approximately, what would you say is your average income in a month ₦.....

Social Participation

14. Are you a member of any social organisation? Yes or No.

15. If yes, name the organization and indicate how long you have been a member of each of the organization.

Organization	Time you've been a member
a)	.....
b)	.....
c)	.....
d)	.....
e)	.....

Extension Contact

16. What are your main sources of information on the recommended uses of soyabean?

a) Extension worker
b) Friends and relatives
c) Traders
d) Organization member
e) Radio
f) Television
g) Newspapers
h) Posts and leaflets
i) Film and Slide shows
j) Agricultural shows
k) Others (specify).....

17. Name three of the sources of information most helpful to you in descending order of usefulness.

i) .....
ii) .....
iii) .....

18. Are there any extension workers stationed in the village or in a neighbouring villages than yourvillage to advise the women on how to use soyabean? Yes or No.

19. How frequent do extension workers visit you?

i) Never:.....
ii) Not frequently: .....
iii) Frequently: .....
iv) Very frequently: .....

20. Have you ever seen an extension demonstration before?

Yes or No.

21. If yes, where did you see it?

a) In my house
b) At a neighbour's house
c) At a relative's house
d) At a friend's house
e) In nutritional unit of the hospital
f) At an ADPs Home Economic Dept.
g) On Television
h) Others (specify).....

22. Did this demonstration encourage you to adopt recommended uses of soyabean? Yes or No.

23. Which of the following recommended uses of soyabean (by NAERLS and IITA) are you aware of, have you tried and/or adopted them?

Soyabean uses	Awared	1st yr. awared	Trial	1st yr. tried	Adopted	1st yr. adopted
Amala						
Bread						
Chinchin						
Dakuwa						
Danwake						
Feed						
Gari						
Kakro						
Kosai						
Milk						
Olele						
Panke						
Puff-puff						
Pap (ogi/akamu)						
Spices for soup						
Tofu						
Tuwa						
Vegetable soup						
Waina						
Yoghurt						

24. If you have discontinued the use of some of the recommended uses of soyabean, what are your reasons for this?

a) Processing difficulty
b) The beany taste
c) It becomes sour easily
d) The products are not easy to preserve
e) The beans is not easy to cook as cowpea
f) Traditional belief against use of soyabean
g) Others reasons (specify):.....

25. Which of the following are your reasons for adopting some of the uses of soyabean?

a) Cheapness of soyabean milk to other milk
b) Cheapness of soyabean tofu to meat
c) Cheapness of soyabean seed to cowpea
d) Cheapness of soyabean spices to locust spices
e) Cheapness of soyabean pap to baby weaning food
f) Cheapness of soyabean feed to livestock feed
g) Higher nutrients of soyabean seed to cowpea
h) Higher nutrients of soyabean seed to cereal
i) Cheapness of soyabean to melon
j) Others (specify):.....

26. What are the general problems related to soyabean uses that you will like researchers or extension workers or government to know?

.....

.....

27. What general suggestions would you like to give to improve the usage of soyabean?

.....

.....