Assessment of the Impact of the Special Programme For Food Security of FAO – Sudan’s In West Omdurman

By

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DEDICATION

To my mother
My father,
My teachers,
My brother,
My sisters, and
To every body helped me with even a word or smile
With all love and respect
ACKNOWLEDGEMENTS

God must be praised first, for the mighty and patience to conduct this study.

I wish to express my sincere appreciation to my supervisor Dr. Abdel Raouf Suleiman Bello for his helpful, guidance, criticism, advice and supervision during the various stage of the research.

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ABSTRACT

This study was conducted to assess the impact of the Special Program for Food Security (SPFS) in West Omdurman, Khartoum State. The study was an attempt to investigate to what extent SPFS has succeeded to achieve the objectives of providing the target group with extension and input supply services to improve their farms output and income-generation capacities. It was also aimed to assess the degree to which SPFS has achieved the objectives of increasing production and income, and thereby has contributed to food security of the beneficiaries.

To meet the objectives of this assessment study, both primary and secondary data were collected and used. Primary data were obtained through a survey by means of use of structured interview, schedule Questionnaire, observation and group discussion. The secondary data were obtained from books, theses, reports, papers and other relevant sources. The simple random sampling procedure was used to select 80 respondents (40 as participants and 40 as non-participants) from the sampled villages, using the table of random numbers.

The main findings of the study indicated that the program has succeeded in improving income of the beneficiaries which is reflected in achieving food security and improving the standard of living. The project contributed more improvement in access to crop inputs, adoption of extension messages and extension packages which is reflected in achieving positive perception of the recommended crops (i.e. Abu Sabaeen, watermelon, okra and cucumber). T-test analysis showed significant difference between participants and non-participants groups with respect to number of variables, namely crop production, crop consumption, net crops income and incomes after and before the programme. Problems associated with implementation of the project included lack of protection fence, disruption in water supply service and overgrazing. The study proposed some recommendations including: expansion and replication of the existing project activities with special emphasis on income-generating activities, promotion of adults education and raising of environmental awareness among the targeted group, especially women.
الخلاصة المنظمة لتنفيذ النموذج الغذائي للأمن الخاص بالبرنامج الأثر للتحقيق الدوام، هذه الأجراءات في أمانة غرب بمنطقة الاتحاد والأغذية، ومحافظة الأغذية - الخرطوم ولاية.

أهداف، التحقيق في المشروع النجاح مدى على للتعرف محاولة الدراسة الأهداف للتحقيق معالمة استخدام التم الدراسة هذه الطريقة جمعهم التم الأولاية المعالمة وثاني، الأولاية النقاش وحقالات والملحظة الباسستخدام الميداني المشح، جمعهم التم الثانوية معالمة الأجهزة الرسائل العمل، أوراق المراجع الرسمية، التقارير وتشمل السابقة الدراسات المنارة ذات الأخرى وسائدة المصدر، (80) أشخاص تعلم حضور التدريس الأمعار في المنهاج، وظيفة مادة الأسئلة، وتحقيق في كذا ساهم كمما وتحسين والدخول والإرشادية، التسويّة، الأشخاص، التحفيز والرسائل الإرشادية المستمرة، على وصول وصول

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هذا النموذج التدريس الأمعار في المنهاج، وظيفة مادة الأسئلة، وتحقيق في كذا ساهم كمما وتحسين والدخول والإرشادية، التسويّة، الأشخاص، التحفيز والرسائل الإرشادية المستمرة، على وصول وصول

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CHAPTER ONE
INTRODUCTION

1.1 Background Information

The Special Programme for Food Security (SPFS) was designed and implemented by the FAO in 2004 to improve food security and nutrition on a sustainable basis, reverse the declining trend of agricultural productivity and bridge the food gap for some vulnerable areas in Sudan. The programme activities were implemented in three sites namely Khor Abu Habil in North Kordofan State, Lower Atbara in the River Nile State and West Omdurman in Khartoum State. The programme interventions were carried out in the three sites concentrating on improving the irrigation systems, intensifying crops, and diversifying the production means by introducing livestock restocking. The activities started earlier in North Kordofan with funding FAO TCP in 2001 and continued on the same conduit with the other two sites with financing mainly from the Libyan Government amounting 1.9 million dollars.

The West Omdurman project areas lie in Ombadda and Jebel Awlia localities in western parts of Khartoum State. Generally the project area is dry with semi-desert characteristics. The population are basically nomads whose life was greatly affected by the 1980s drought and decreasing rainfall resulted in lesser flow of the major seasonal valleys (e.g. Wadi El Mugadam) running throughout the area. The Western part is a desert area with herding as the major economic activity, while the Southern area is characterized by being a livestock and agricultural area, and by hosting the new Khartoum International Airport. The nearest community is 86 kms and the more distant one is about 150 km from the outskirt of

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Omdurman town, boarding the Northern and North Kordofan States, White Nile State, and Karari locality in Khartoum State.

1.2 Research problem:
The major elements of the strategy proposed SPFS activities as indicated in the project document (2001) including; integration of the various components, in order to secure and stabilize food production and generate new revenues, set up and/or strengthening farmer organizations, demonstration of simple, appropriate and accessible technologies in farmers field by farmers themselves, and identification of farmer’s constraints, and search for sustainable solutions to these constraints, allowing wide adoption of the demonstrated technologies.

This study is an attempt to investigate to what extent that the SPFS has succeeded to attain its main prescribed objectives of achieving food security in the study area.

1.3 Research objectives:
The study was designed to evaluate SPFS in terms of its objectives organization, target groups, approach, offering and achievements. The specific objectives of the study are to:

1- Investigate the extent to which SPFS has achieved the objectives of providing the target groups with extension and input supply services to improve their farm output and income generation capacities.

2- Assess the degree to which SPFS has achieved the objective of increasing production and income, and thereby has contributed to security of its beneficiaries.

3- Investigate the extent to which SPFS methods are effective and have contributed towards achievement of objectives of SPFS.

1.4 Research hypotheses:
The following hypotheses were put to be examined:

1. The approach adopted by SPFS has succeeded to promote popular participation in the project activities.
2. Adoption rate of the respondents related directly to their opinion and awareness.
3. Respondents benefit from the extension packages related to their participation, access to input production and access to extension services.

1.5 Research design:

1.5.1 Research methods

The research methods adopted in this study include social survey and statistical methods.

1.5.2 Data collection and analysis:

To achieve the objectives of this study, both secondary and primary data were collected and used. Secondary data were obtained from books, thesis, reports, official records and SPFS documents and other relevant sources. Primary data were collected through field survey by using structure interview (questionnaire), observation and group discussions were also used.

1.5.3 Data analysis:

Different statistical procedures were used in this study for purpose of descriptive analysis, including frequency distribution and T-test procedure (to determine whether the observed difference between participant and non-participants in terms of the study variables were significant).

1.5.3.1 Sample selection:
This study was conducted to cover Um bada locality of Khartoum state. From this locality, two villages covered by (SPFS) services, were selected namely Um-Harout one, Um-Harout two. The simple random sampling method was adopted to select (80) respondents representing a total sample (40 as participant and 40 as non-participant). The total beneficiaries as shown by the project records are 1,500 households. Thus, table of random numbers was used to select 20 participant household from each sampled village using the lists provided by the program authority (resident extension officer). Another group of (20) respondents as non-registered to the (SPFS) was also selected by means of random sample selection method.

1.6 Organization of the study:

This study consists of five chapters as follows:

Chapter one: Is an introductory chapter, it includes background information, statement of the research problem, research objectives, hypotheses, research methodology and organization of the study.

Chapter two, reviews the literature. It covers concept and definitions of food security, household food security, food security, food insecurity in Sudan, agricultural extension, adoption, communication, and other related concepts. Chapter three, provides general information about the area of study. Chapter four, shows results and discussion. Chapter five, is conclusions and the proposed recommendations of the study.
2.1 The concept of food security:

The concept of food security emerged in the 1970s after the 1972-1973 Sahel famine and the world food conference 1974. Food security used in its most general form essentially means a state of affairs where all people at all times have access to safe and nutrition food so as to maintain a healthy and active life. This definition endorsed by number of authorities (e.g. FAO, WHO and others) as indicated by World Bank (1986:4).

The World Bank defined food security as: “Access by all people at all times to enough food for an active and healthy life” (World Bank, 1986: 4).

This definition indicates that to achieve this goal, three conditions have to be met namely: (i) Ensuring stability of food supply, (ii) Ensuring access to food, (iii) Ensuring adequacy of food supply. Moreover, Maxwell (1991) argued that this definition is incomplete in four respects: firstly, it subordinates the concept of food security to that
of food consumption. Secondly, it pays insufficient attention to people's own perception of risk. Thirdly, it limited issue of food security at the national level, and it leaves open questions about the difference between poverty and food security. He suggested a new definition of food security which stated that “A country and people are food secure when their food system operates efficiently and equitably in such away as to remove the fear that there will not be enough to eat” (Maxwell, 1991:2). This definition includes the efficient distribution and production of food and the financial ability to afford food so it concerns with the whole food system to be efficient and equitable.

In addition, food security workshop organized by FAO (1996) defined food security as “adequate access to food for all sections of the population at all time's”, “adequate” means enough for active, healthy life, “access” means ability to acquire food by production, purchase, or exchange (Imam, 1999). Therefore, this definition concentrates on the enough food quantitatively as well qualitatively. Furthermore, the World Bank defined food security in regards to poverty and hunger, it indicated that, food security is defined as: “access by all times to enough food for an active, healthy life, its essential elements are the availability of food and the ability to acquire it” (Imam, 1999).

FAO has operationalized the concept of food security within its mandate by stressing those aspects of the phenomenon that are related to the availability and stability of food supply at the national level, through both time, space and access to food supplies at the household and individual, as well as national level. The later consideration is expressed in the definition of household food security expected by the committee on world food security (1996) as “physical and economic access to adequate food for all household members under risk of losing such
access” (FAO, 1996:2). This definition includes three dimensions: Availability, stability and affordability of sufficient food. Adequate food available to meet that, is an average sufficient food supplies that should be available to meet consumption. Affordability means that, even with ample supplies, many people still go hungry because they are poor to produce or purchase what they demand, while stability indicates stability in food supplies and market.

According to Maxwell and Franken Berger (1995), there is no a single universally accepted definition for food security, but most definitions including the FAO, World Bank, Maxwell’s, and others identified four common elements to meet the objectives of food security including:

1. From the macro level to the micro level: concerns have shifted from the national level to the household level with emphasis on ensuring access to available food.
2. From the concern: To ensure an adequate levels of food supply towards a concern for improving physical and economic access to food and household standard of living.
3. From household security towards individual: Food security for the vulnerable sectors of the production women, children and the elderly.
4. From a concern for short-term food security towards long term food security: This element is concerned to the concept of sustainability and respect for the environment.

2.2 Food security at sub-national, national and global level:

As indicated by Alamgir and Arora (1991), food security can be divided into three levels:
2.2.1 Sub-national food security:

Is the assured availability of food for individual household to meet their minimum consumption requirements during a given period. The key words are production, internal trade and communal food security arrangements.

2.2.2 National food security:

Is the assured national availability of food to meet current minimum requirements per capita during a reference period (a year normally) and to meet any unexpected short fall over a limited period (say three months). The determining variables are production, imports and exports and stock changes.

2.2.3 Global food security:

Is the assurance of an adequate food supply and/or access to it for all, both at national and sub-national level. The key words are global production and stock, trade, food and capital aid, the distribution of global resources and income and regional and global food security arrangements.

2.3 Food security in the Sudan:

Sudan suffers from high population growth rates, severe environmental deterioration and in some cases long term adverse climatic changes which particularly affect the small holders. The food security status is very poor, for example in 1987 the food supply status in percentage of requirement was 92% which shows that its deficit and food supply trend continues to decline (Musa, 2005).

Sudan depends on foreign exchange on a limited number of traditional export crops, subjecting to a wide price fluctuation in the
international marketing, for example cotton and there is also a high foreign exchange spending specially on food imports. The Sudan also has difficulties in providing agriculture with adequate framework of incentives, services, infrastructure and institutional support. Scarcity of managenerial and implementation capacity has also hindered the development of overall programmes with clearly defined focus and objectives. The result has been declining self-sufficiency over the years 1982-1983 and 1988-1989.

Food security takes priority overall parameters of human development. Since cereals constitute the main item of Sudanese food, agriculture figures prominently in food security and the economy as a whole. Agriculture absorbs two-thirds of the labour force, contributes about 90% of the value of exports, if we exclude petroleum exports, and about 48% of the GDP and it provides raw materials for over 85% of the manufacturing industries.

Food production, particularly agriculture, faces several handicaps, including the civil war and tribal conflicts, drought in areas of rainfed agriculture, soil deterioration and the general economic problems of fiscal and pricing policies, heavy taxes, marketing bottlenecks, poor farm management, high cost of inputs and lack of credit (the ratio of agricultural financing represents 7% of the total credit extended by banks) and many borrowing farmers were driven into default (Musa, 2005).

The development of large scale mechanized farms in the 1960s and research and development in the modern areas of the center and north of the country with 80 of investment devoted to this sector, and 80-90% to agricultural research also support mechanized irrigated farms.
The war in the south is a major cause of food insecurity since 1987-1988. North Sudan contains more than two million people displaced by the war equivalent to 12% of the population and the cost of the war estimated at over 5 million per day or 27% of government expenditure. There is no doubt that an end to the war is the single most important requirement for improving food security. Drought is a natural cause and exacerbate Sudan's food security problem. It affects the agricultural output, employment and prices, and also results in permanent migration.

A human centered adjustment should make food security and other indicators pertaining to human conditions central target in both programme design and performance criteria.

Food security policies should be given in the first place to agricultural development, and the second to consumer subsides and in the third to a package of employment programmes and consumer subsidies focused on the rural landless and the urban poor.

Diagnosis of food insecurity requires the kind of analysis, combining of the food system to establish the underlying causes of food insecurity.

Definition of a criterion for choice of intervention designed to provide the basis for systematic analysis of intervention terms of not only of a cost effective terms of administrative feasibility. But selection of intervention, implementation and evaluation are also to be used.

Sudan in its planning procedure has neglected the initial analysis of food security. However, the absence of a central food security or food policy coordination office has delayed the preparation of a plan and the implementation of integrated food security interventions (Musa, 2005).
2.3.1 Sudanese food: Types, habits and transformation

Sudan is a very large country with contrasting and very sharp differences in its characteristics. From north to south, the desert, semi-desert with ephemeral grasses and xerophytes scattered shrubs to short grass savannah, through long grass savannah to trapped forests with evergreen trees and tall and very thick canopy of grasses. This gradual transition is the result of the quantities of rainfall received in each ecological zone, which varies from less than 50 mm per annum, received in 1-3 months in the north to more than 1500 mm per annum spread over 9 months in the south. The variation in rainfall had also its effect on the soil formation and the topography of the country. The sandy soils in the north and northwest extend through extensive flat plains of light and heavy clay soils in the centre and eastern regions, to heavy latteritic soils in the equatorial region of south. The isolated Rocky Mountains stretches and pockets of gravel along the Red Sea hills, the Nuba Mountains and Jebel Marra plateau are prominent and in the east, centre and west of Sudan respectively (Mohamed and Ahmed, 2006).

The topography is in general flat with mild undulations in the desert and semi-desert sandy "Goz" areas in the north and northwest, to flat clay plains with mild gradients allowing gravity irrigation from the numerous rivers and streams traversing them from south and southeast into the north (Mohamed and Ahmed, 2006).

The flat plains are the seat of agriculture, forestry and livestock production using gravity, flood and flush irrigation and/or the direct rains and underground water in the Gezira, Rahad, New Halfa, the Sugar States, the Gash and Tokkar, the Mechanized Crop Production Schemes, the Gum Arabic zone and nomadic animal raising plains (Mohamed and Ahmed, 2006).
The heterogeneous nature of the country resulted in sharp variations in the production of food and other crops. The relatively cold weather in the four winter mouths in the north allows the production of the short day crops such as wheat, legumes, citrus, fruits and drought-tolerant date palm trees. A range of food and industrial crops are grown in eastern, central and western Sudan such as sorghum, millet, sugar cane, cotton, gum Arabic, sesame and groundnuts using irrigation and the direct rains (Mohamed and Ahmed, 2006).

In the south, tropical fruits, rice, root crops, tea and coffee are grown.

Animals are raised mainly by nomadic tribes in the plains from the Red Sea coast through the central rain belt in the clay plains in the east and centre through the sandy areas in the west and northwest. The nilotic tribes of southern Sudan keep large number of cattle as status symbol and for traditional transactions as "Dawary" in marriages. In the north, very few animals but of good quality are raised in the houses or orchards for family milk and meat and to sell when there is need for money. Some oxen, camels and donkeys are used as draught animals for water lifting and for transportation in the north and western Sudan (Mohamed and Ahmed, 2006).

Vegetables are grown all-over the country, mainly for home consumption and for the nearby markets in small quantities.

The very district specialized pattern of production dictated a similar pattern of consumptions. As recent as the 1970s of the 20th century, most Sudanese except the few employed by the government and are transferred with their families periodically to all regions of the Sudan, and those traders who moved to areas other than their origin area "the
Galaba" did not know other food than what they were used to eat at their birth places. It is normal to replenish the exhausted stocks with new quantities periodically (Mohamed and Ahmed, 2006).

Over 90% of the inhabitants of the Northern Province (Shendi – Old Halfa) used to eat pure wheat as their staple food in the form of loafs of bread or the local bread "Kabieda" and 'Fatir". Rice is also used as an additional dish cooked with water, oil and milk. The same is true with the settled inhabitants of central Sudan east of the White Nile and the River Nile who mainly consume sorghum (dura). On the west bank of the White Nile and River Nile, the inhabitants use millet (dukhn) as staple food. In both areas, the preparation of the food from these stables is either thin sheets (kisra) or thick porridge (asida). The only difference is the removing the taste from the millet grains and sometimes fermenting the gains to give them a desired smell 10 dura and taste (damirga) in Western Sudan. In the rural areas in the old days, sorghum and millet bread were eaten 3 times a day. On the Red Sea shores, fish and rice (sayyadia) are consumed as a main dish. In the south, root crops, (bafra) and maize are used plus some rice grown in the flood areas of Bahar El Gazal region.

Vegetables are used in all regions in varying quantities and frequencies, except dried okra (weikah) which is commonly used in all places every day (Mohamed and Ahmed, 2006).

Some rural tribes like the nomads do not use fresh vegetables and mainly depend on milk, meat, rice and wheat floor (donuts).

However, the recent adverse conditions in rural Sudan, such as drought, desertification and tribal conflicts forced the massive internal displacement of the rural people in search of shelter and safety. Families
and sometimes tribes settled around most towns and cities, some of them for years now. They had no choice but to adopt the habits of their hosts whether good or bad including the food habits (Mohamed and Ahmed, 2006).

As the mobility was from the rural areas in all directions (the east, west, north and south) to settle near the urban centers in refugee camps and/or the buildings under construction supported by the national and international humanitarian organizations. Generally, these internally displace people (IDPs) depend on food donated to them in regular rations (Mohamed and Ahmed, 2006).

The food basket they receive is always different from what they used to eat at their places of origin. Even when these (IDPs) get settled and earn some income, the food they buy is influenced by what is available for the hosting communities in the towns and cities. Wheat flour as donated ration is dominating in all (IDPs) camps and the habit of eating wheat bread is sky-rocketing all over the regions of the Sudan as loafs of bread and/or "Gorrassa" (Mohamed and Ahmed, 2006).

It could be concluded that now about 70% of all Sudanese are eating wheat bread at least once every day that could sometimes be the only meal they could offered/day because of their poverty. Sorghum and millet bread and "porriage" are retreating in importance among Sudanese and are becoming meals of special occasions. Fish in the Red Sea coast, and in the flood plains in the south is eaten by the inhabitants of these areas (Mohamed and Ahmed, 2006).

2.4 Food insecurity:

As indicated by Bryceson (1990) food insecurity defined as: Inadequacy of the quantity and quality of food consumption, as
“Inadequacy of the quantity and quality of food consumption, as well as the irregularity overtime” (Bryceson, 1990:15).

In the same context, the World Bank (1986), determined two kinds of food insecurity:

a) Chronic food insecurity, which indicates a continuously inadequate access to food supplies.

b) Transitory food insecurity, this is refers to a temporary decline to adequate food supplies, it is a temporary decline in a households access to enough food. It results from instability in food prices, food production, or household incomes and its worst form can produces famine.

Transitory and chronic food insecurity is a continuously adequate died cause by the inability to acquire food. It affects households that persistently lack the ability either to enough food or to produce their own (World Bank, 1986). Furthermore, Rivera and Qamar (2003) identified two main factors of food insecurity. These are:

1. Generic factors such as poor governance and lack of institutional support.

2. Factors related to different elements of food security as:
   - Unavailability of food because of natural disasters such as drought, floods, crop failure .. etc.
   - Lack of access to food owing to inadequate purchasing power.
   - Poor food utilization because of poor health, poor sanitation or debilitating disease such as AIDS.

2.5 Household food security:
The World Bank defined household food security (HFS) “as the availability of enough food for life, health and growth of the young and for productive effort” (World Bank, 1986:4).

However, World Bank (1986) stated that the concept of (HFS) is concentrated on access and risk, also take up issues connected to the concepts, including household nutrition, livelihood, substantiality, cultural acceptability, efficiency and human rights. To many definition and conceptual models agree that the key defining characteristics of HFS is to secure access all times sufficient food deal in term with: (a) Sufficiency; (b) access; (c) security; (d) time. In this context the FAO defined HFS as: “the basic food needed or is the food adequate to meet nutritional needs (World Bank, 1986).

2.6 Agricultural extension:

Extension is an ongoing process of getting useful information to people (the communication dimension) and then in assisting those people to acquire the necessary skills and attitudes to utilize effectively. This information or technology is (the educational dimension). Generally the goal of extension process is to enable people to use these skills, knowledge and information to improve their quality of life (Bannaga, 2004).

The term, agricultural extension, narrows the focus and defines the areas to which the extension process is applied. Maunder (1973..3) writing in the first edition of the Extension Reference Manual (1983) defining agricultural extension as "service or system which assists farm people, through educational procedures, in improving farming methods and techniques, increasing production efficiency and income, bettering
their levels of living, and lifting the social and educational standard of rural life” (in: Swanson and Claar, 1984).

Advice and assistance extended to farmers to help them to improve their methods of production and marketing is called agricultural extension. However, agricultural extension should not be seen only in the context of increasing agricultural output. Extension is part of the effort to achieve balanced social and economic development of rural areas. This is necessary in order to maintain the increase in productive capacity (Adams, 1982).

2.6.1 The development concept of agricultural extension:

The achievement of the recent widely accepted goals of agricultural and rural development as mandated by the World Conference on Agrarian Reform and Rural Development (WCARRD), demands the adoption of broad definition of extension. While it is essential to promote the transfer of technology to a large and medium scale farms, this is not the only task of extension. Meeting the obligations of governments to broaden the production base and include the participation of all people requires that extension also serves the poorly educated rural majority (Hammandach and Ryon, 1989).

Assistance to this group must be provided so as to raise the levels of understanding and increase the capacity to apply improved technology, now and in the future, in order to achieve sustained improvements in productivity and living conditions. The educational function of human resource development for agricultural and rural progress is the essence of extension.

2.6.2 Extension objectives:
The main reason to employ extension services is to increase farmers income. The alternative rural extension objective would include the following according to Roling (1982).

- Creating income-generating opportunities appropriate for the mass of small scale agricultural producers through improving the productivity of their resources by providing better access to information, goods, services and markets.

- Contributing to a more equitable distribution of increasement in agricultural incomes through offering the distribution of resource available to small scale producers.

- Contributing to agricultural development aspect of broad based on degraded rural development efforts organized themselves, so as to allow them to participate as informed, and vocal, partners in development efforts, possibly with a new view of helping rural people to develop their own (rural development acquisition system).

2.7 Adoption of innovations:

Adoption of innovations according to Rogers (1962), involves a mental process through which an individual passes from first hearing about an innovation to final adoption. On the other hand, the diffusion process can be defined as the process by which an innovation (practice, idea or object perceived as new by the number of social system), is communicated over time through certain communication channels among the members of the social system.

The classical model views adoption as a process involving five stages which are:
1. Knowledge: occurs when an individual (or other decision-making unit) is exposed to innovation's existence and some understanding of how it functions.

2. Persuasion: occurs when an individual (or other decision-making unit) shows favourable or unfavourable attitudes towards the innovations.

3. Decision: occurs when an individual (or other decision-making unit) engages in activities that lead to choice to adopt or reject the innovations.

4. Implementation: an individual or other decision-making unit puts an innovation into use.

5. Confirmation: an individual (or other decision-making unit) seeks reinforcement of an innovation decision already made, but may reverse if exposed to conflicting message about an innovation (Roger, 1983).

2.8 Communication:

As indicated by Rogers and showmaker (1971), communication is "a process of transferring information and trends from the source to receiver".

Communication is "a process in which participants created and share information with one another in order to reach a mutual understanding" (Rogers, 1983). Another definition of "communication channel is the means by which a message gets from a source to a receiver" (Rogers, 1983) this definition indicates that communication is the process by which an information or idea perceived as new by a number of social systems.

2.8.1 Types of communication channels:
According to Rogers (1983), "researchers categorized communication channels as either:

1. Interpersonal channel.
2. Mass media channel.

Interpersonal channels involve a face-to-face exchange between two or more individuals. These channels have greater effectiveness in dealing with resistance or a pathy on the part of the communicate. Mass media channel are those means of transmitting message that involve a mass media, such as radio, television, newspapers and so on which enable a source of one or a few individuals to reach an audience of many.

2.8.2 Cosmopolite versus localite channels:

Cosmopolite channels are relatively more important at the knowledge stage because knowledge occurs when an individual or other decision-making unit is exposed to innovations existence and some understanding of how it functions, and localite channels are relatively more important at the persuasion stage because persuasion occurs when an individual or other decision –making unit forms favorable or unfavorable attitudes towards the innovation-decision process (Roger, 1983).

2.8.3 An ideal sequence of use of communication channels:

Rogers (1983) investigated that the importance of interpersonal and mass media channels in the innovation-decision process with farmers and he found that "if the probability of adoption were to be maximized, communication channels must be used in an ideal time sequence progressing from mass media to interpersonal channels" Rogers (1983) .

2.9 Measurement and assessment of project effects and impact:
Since projects seek their justification in enhanced product crop yield, health service … etc. project effects, as defined and, in turn, in the impact on living conditions of the project beneficiaries, it is essential that both effects and impact be systematically measured or assessed.

**a) Measurement of project effects:**

Effects are defined as the outcome of project outputs. They include, for example, incremental crop production in agricultural projects, increased use of health services or higher attendance at schools because of improvements in facilities and services. Data is often available as part of the activities of project management. Thus, the size of crops in absolute terms or yields in relative terms are measured prior to harvest by means of crop-cutting experiments or at harvest time. The number of patients attending medical facilities or the number of inoculations given can be obtained by means of simple statistical forms; similarly with children involved in and attending schools.

Since these measurements are normally closely tied to project management, there is a clear understanding of their use and their purposes. The problem is one of organization and reporting. Forms must be designed, staff trained in their use, the data professionally analyzed, evaluated and recorded (IFAD, 1986).

**b) Impact analysis:**

Project impact relates to changes in production and actual living conditions among project beneficiaries, flowing from and attributable to the project. Since improvement of living conditions is the ultimate, often underlying, objective or goal of most projects, it is important to know for the purpose of evaluation and subsequent planning whether (a) conditions have improved; and (b) whether the change, if any, can be incorporated in part or in total to the project, as distinct from other causes. The term
"assessment" is used in preference to "measurement" since what is desired is not precise and absolute measurement but measurement of changes in relative terms, i.e. over time as a consequence of a project intervention (IFAD, 1986).

The theory of impact measurement is derived largely from biological experimentation. The problem is that human populations do not lend themselves, to the same degree as potatoes or rice, to controlled experimentation. Whether the project has an impact, and how much, is therefore in most cases is a matter of judgment. Nonetheless, assessment does not exclude the need for concrete information. Available facts should be carefully marshaled as the basis of assessment. "Projects are planned and financed because a body of knowledge and experience exists indicating that certain activities can be expected to produce certain results. They have, in other words, a modus operandi. Evaluation aims to establish whether these results can be detected in a particular case and, if so, to plausibly infer that the project activities are responsible" (World Bank, 1993).

The basic questions which an impact analysis of a project should attempt to answer are as follows:

1) Whether the socio-economic conditions (incomes, levels of living, etc) of the target groups have changed in significant ways as a result of project activities;
2) If so, in what direction (positive or negative)?
3) To what extent; and
4) Why (causal relationships).

These questions imply assessment of project-induced changes in target groups and other socio-income groups, on the basis of "before" and "after" and "with" and "without" project interventions. "Before" and
"after" comparisons involve establishing the baseline or benchmark before project implementation and assessing changes – anticipated and unanticipated – induced by the project on completion and at full development. "With" and "without" comparisons require selecting a "control area" or "control group" comparable to the project area or group and making before and after comparisons for changes occurring in both areas/groups. The purpose is to account for non-project-induced changes such as rainfall or drought, government policies regarding price subsides, or inflation. Allowances for impact of benefits and disbenefits derived from such exogenous factors should be made while assessing the project-induced changes (IFAD, 1986).

However, it is also necessary to take into account the following considerations regarding "with" and "without" comparison, i.e., comparison of impact on project target groups vis-à-vis control groups:

* The comparison assumes an experimental approach which is both difficult and expensive.

* Even if such comparisons are made, it may be difficult to establish causal relationships between project interventions and variations in the conditions of the project target groups.

* What was initially selected as a control group/area might not remain so for the full duration of a project or until its full impact is felt; the control group/area may itself be covered by one or more projects. An alternative choice with respect to a control group may be a sample of non-participants in the same project area, such as in health, education, rural credit, or irrigation projects, whenever the direct benefits to the target group become clearly identifiable. However, in these cases, too, the non-participants may become participants before project completion. Also, it should be realized
that non-participants in the same project area may benefit indirectly from such projects. Non-participating blacksmiths and carpenters, for example, may benefit from an increased demand for ploughs generated by cash credit for oxen to farmers, the direct beneficiaries.

* Some benefits take longer to work out than others. When, therefore, should evaluation take place? Within three, five, ten or twenty years after the end of the project? The timing may critically affect the results of the evaluation. No simple rule of thumb can be applied. The date should be decided for each project on the basis of when significant impacts can normally be expected, depending on the nature of the project (e.g. a health, education or irrigation project which has a long gestation period compared to a rural credit or agricultural extension project) (IFAD, 1986).

c) The data:

Typically, a few of the following fields are covered in data collection for M & E depending on the nature of the project.

1. Household-level data:
   * Income (direct).
   * Assets (proxy), e.g. house (type and living area), land, livestock, farm machinery, durable household goods.
   * Food consumption – normal diet (composition and quality), special food (or extra) and frequency.
   * Clothing, e.g. type and number of suits per year.
   * Employment, e.g. number of days gainfully employed in a year or by seasons.
* Health and sanitation – access to clean drinking water and medical services, anthropometric data regarding school age children.
* Education and social services.
* Membership and activities in participatory institutions.
* Perception benefits (and disbenefits) from the project (by beneficiaries of various socio-income groups), who benefits, in what manner (directly, indirectly, and to what extent).
* Role of women in development and its impact on them.

2. **Community-level data:**
* Access to roads and other economic infrastructure, markets, irrigation, public transportation.
* Credit institutions and credit availability, credit terms, access by small farmers and the landless.
* Extension and other services, input supplies, coverage of and access by small farmers.
* Training facilities and programmes for training farmers and beneficiaries.
* Facilities for education, health including family planning, safe and clean drinking water and recreation.
* Special facilities, if any, for children, youth and women.
* Participatory institutions, profiles of membership and leadership (by sex and socio-economic status).

These fields must be expressed in terms of indicators if they are to be operational for impact evaluation. At least some of them should be divisible or "distributional" by gender or other socio-economic
categories, so as to give specific information on changes in the conditions of the very poor, of women and of other neglected and disadvantaged groups (IFAD, 1986).

**d) Methods of data collection:**

Samples surveys and various kinds of in-depth probes of households, institutions or communities are relevant to most agricultural and rural development projects once secondary data sources have been fully exploited. As noted, sample surveys may be required to achieve data that are representative. For example, if we wish to know incomes of the target population, divided into significant socio-economic groups, before and after the project, there may be no alternative but to examine a medium or even a large sample of households (IFAD, 1986).

In-depth studies, on the other hand, offer the best mechanism for examining causal or explanatory relationships. As noted, the term "in-depth study" covers a variety of techniques, including intensive questioning of a very small number of households, the use of key informants or the study of community and institutional characteristics. There is a role for both these techniques in impact evaluation. Considerable skill, however, is required in obtaining the correct blend. The term "rapid rural appraisal" is sometimes used. However, as the name implies, this technique may be more relevant to project appraisal, i.e. the preparation of projects, than to the study of change or impact assessment. Also, it assumes availability of high level skilled appraisers, a condition which may not always be easy to fulfill. Unfortunately, there is no "rapid" equivalent to sample surveys if the objective is to study the changes in income of similar factors over time (IFAD, 1986).

1. **Sample survey:**
Ideally, baseline surveys should be undertaken at the project preparation or appraisal stage, when the data and findings could also be used for project formulation and identification of target groups. A common difficulty faced by project designers has been the lack of reliable data about the socio-economic attributes of the target populations. However, if a baseline survey cannot be undertaken at the project preparation or appraisal stage, it should be completed early in the implementation stage, preferably in the first year or before significant effects and impacts are likely to have occurred.

To capture the full impact of the project, follow-up surveys using the same set of variables and the same samples of households as at the baseline should ideally be repeated every year of the project life, and, as appropriate, three to five years beyond project completion. Whether such surveys can be carried out annually will depend on the quality and number of staff available, the size of the sample(s), the amount of information to be collected, the method of data processing, and the time required for analysis. It would be desirable to conduct three surveys after the baseline: the first at mid-term, when corrections in project design or implementation can be made; the second at project completion or within the next year or so (terminal); and the third at three to five years after project completion (ex-post), depending on when the full impact of the project is expected to have been realized.

2. In-depth case studies:

Here is in-depth or case study which means a study that makes use of qualitative and quantitative data derived from a relatively small (often purposely selected) sample for a specific purpose, or which examines an institution or community structure.
In-depth studies are particularly suitable when quantification is impossible and simple indicators cannot be designed, or when there is need to look beyond them. The M & E unit might, for instance, want to go beyond the indicator "membership in participatory organization" to assess the quality or effectiveness of the target group's participation. Thus, for purposes of qualitative analysis, in-depth studies can be undertaken independently of sample surveys, as exploratory studies before surveys, or in pursuit of particular issues following surveys.

Much data relating to household and community indicators can be collected with the help of selected participant surveyors or local enumerators. School teachers or local government officials such as post office staff, for example, could be given some training in data collection. In some circumstances this would be a cheap and effective way of building up time series data for impact evaluation as well as for planning.

Another cost effective method, perhaps more desirable from the point of view of beneficiary participation, is to involve the beneficiaries themselves in recording their household data. For example data related to their incomes, expenditures for consumption and production, acquisition of durable goods and capital assets… etc.

Unfortunately, little thought has been given to involving beneficiary groups in designing or implementing monitoring and evaluation systems. Developing this under-used resource would also help to achieve the goal of beneficiary participation in decision making.

e) Responsible agency:

There are valid reasons for having evaluation or impact assessment carried out by an agency higher in the administrative hierarchy than the
project management unit. Advantages that can be provided by the outside assessment include:

a. Greater objectivity:

b. The required expertise (multi-disciplinary, for socio-economic research and data analysis) normally not available among project staff who are usually technicians assigned to execute the project and deliver targeted outputs in a specified period.

c. Assured terminal and ex post evaluations, which can be carried out only after project completion, when project resources have been exhausted and project staff might not be available.

d. Decreased duplication of surveys, which are time and resource consuming.

e. Coordinated data collection and the use of data collected by other agencies in the project area (and/or comparable adjacent areas for purposes of "control group area" comparisons).

f. Sharing of data collected for the project with other national agencies – the central planning agency for example – for their own use in planning.

In countries where three- or two-tier Monitoring and Evaluation systems either have not been established or which have not developed in-house expertise for impact evaluation, project management may want to contact outside agents – research institutions, universities, private consulting firms or individuals – to design and conduct impact evaluation studies and surveys (IFAD, 1986).

2.9.1 Special topics:

a) Target group participation:
Since the mid-1970s, and particularly as a result of WCARRD in 1979, there has been a growing realization that if rural development projects are to have any real impact upon rural poverty, then the rural poor themselves should participate in the planning, implementation, monitoring and evaluation of the projects. Many international, governmental and non-governmental agencies have made commitments to bringing about this participation of the rural poor in the development process.

Beneficiary participation, particularly by disadvantaged groups, is viewed as both an end and a means to development. From this point of view all rural development projects, whether or not consciously designed to promote beneficiary participation, involve participation and should monitor and evaluate their impact in terms of target group participation.

Participation is a process that gradually unfolds over a project's life and beyond. It is a phenomenon that cannot be measured in quantitative terms by a single "snapshot" exercise. The Monitoring and Evaluation of participation in rural development does involve a number of quantifiable aspects, and these can be measured. Equally important, however, is understanding the unfolding process and interpreting the wide range of results which might occur. Hence, we need to collect data and observe phenomena related to both quantitative and qualitative indicators (IFAD, 1986).

1. Quantitative assessment:

Quantitative indicators such as the following represent a first level of monitoring and evaluation and can be incorporated into any rural development project.

a) Organizational indicators:
Many rural development projects are either build around or lead to some form of formal organization (e.g. a cooperative). The extent of the rural poor's association with such an organization is a measure of their formal participation. In this respect, the following statistics could serve as useful indicators.

* Percentage of rural adults within the project area who have some knowledge of the organization's existence.
* Percentage of rural adults within the project area who are formal members of the organization.
* Frequency of members' attendance.
* Changing size of membership over the project period.

If these indicators were monitored not once but continually during the lifetime of the project, we should gain some picture of the extent of participation. The indicators could be disaggregated with reference to gender and different socio-economic groups (IFAD, 1986).

b) Indicators of project group participation:

Many rural development projects direct their activities towards groups of small farmers or landless people. In such projects, the development of the groups is an important objective. A range of quantitative indicators like the following can be used in determining its success.

* Number of project groups and associations of project groups formed.
* Number and percentage of target-group household members who become project group members.
* Socio-economic composition of groups.
* Number and attendance rates at project group meetings.
* Total man days of labour contributed by project group members to project activities.
* Number of project members aware of and/or using agency services developed or promoted by the project (IFAD, 1986).

2. Qualitative assessment:

In addition, qualitative studies can be undertaken on a wide range of topics, such as organizational growth, leadership structure, project group activities and outputs, and the institutional impact of these groups. For such studies, participant observations and in-depth studies into small samples of purposely selected households for case studies are likely to be useful methods.

The collection, analysis and interpretation of both quantitative and qualitative information gathered about a project should also be a participatory exercise, with both staff and project group members sharing in the information gathering and interpretation. The best forum for interpretation is probably open discussion. Group interpretation should take place periodically, e.g. every three months, and once annually for an analysis of progress to date. Whenever possible, the verbal interpretation should be translated into some kind of diagram. Project group meetings can also be used for the M & E exercise in terms of seeking the views of the group on changes that seem to be happening and for understanding in more detail the quality of these changes. Group discussion also offers access to a large body of knowledge and opportunity for mutual checking.

2.9.2 Monitoring and ongoing evaluation at the project level: an example from an agricultural extension project:
The purpose of an extension project or the extension component of an agricultural production project is to transfer new agricultural technology or research findings to the farmers so that they can raise their yields and production. In turn, assuming that other things – particularly prices – remain the same, this should raise farmers' incomes and standards of living and, in the long run, the quality of their lives.

The extension system employs agents whose task is to contact as many farmers as possible and explain to them the new technology, using visual aids or publications if available, and demonstrating the results. But new inputs – fertilizers, pesticides, improved seeds, involve additional investment and risk of failure. The small farmers whose rural development projects are expected to benefit are unwilling to make additional investments and undertake risks unless they can feel almost one hundred percent sure that the result of the new technology will be an improvement. Paradoxically, this is particularly true in poor countries where agricultural research and extension services are not well established, and hence the farmers remain sceptical of the efficacy of new extension packages. They need a lot of hard evidence, through repeated demonstrations of actual results, before agreeing to try the package. It is only when a significant proportion of small farmers "adopt" the extension package that the extension service has succeeded in its efforts to reach them. However, the real test of extension efforts lies in the continued and progressively expanded adoption of the extension package (IFAD, 1986).

Such continued and progressive adoption will depend on a number of factors. The primary one, of course, is the efficacy or productivity of the new package – how reliable it is in delivering the promised results in incremental yield and production, both in quantity and quality of the
main product and its important byproducts (e.g. straw for cattle feed from paddy or wheat crop). There are other important factors, often outside the control of project management. These include the relationship between the price of the new inputs and the returns from incremental yield or production; availability of credit on easy terms for purchasing inputs; marketing facilities for farm outputs; availability of family or other labour for additional work required; value placed by the farm household on leisure time, which may now have to be reduced for additional work on-farm; and actual income derived by the farm household from incremental production. All these factors will also have to be monitored and evaluated on a regular basis for effective M & E of the extension project, with appropriate indicators devised.

**Choice of indicators for progress reporting/monitoring:**

The indicator almost universally used for measuring delivery of extension services in "number of farmers contacted" by an extension agent in a given period. This indicator relates only to the first step in extension work, which, as we have seen, has numerous steps, e.g. demonstrations. But the extension agent's work is not complete until farmers adopt the extension package and do so on a repeated basis. Adoption rate, therefore, may be a better of extension results. An extension package contains many elements, however, such as fertilizers, improved seeds and improved cultivation practices, which again can be broken down into land preparation, weeding, and so on. Each of these elements could be treated as an indicator. Since their number can become too large, in practice it is indicator desirable to pick one or two major elements of the recommended extension package. For example, purchase of fertilizers and/or improved seeds, as proxy indicators of "adoption
rate". These proxy indicators are quantifiable and verifiable. They are also the most important elements in extension packages (IFAD, 1986).

For example, an indicator such as "purchase of fertilizer" can be used to monitor "adoption rate". But it also provides the base for ongoing evaluation of the efficacy and efficiency of the recommended package in terms of incremental yield and cost of additional inputs, including labour. It will also be necessary to collect seasonally reliable data on yields and project prices on a regular basis and on the sale of agricultural inputs to project beneficiaries. All data will have to be disaggregated by extension agents or area.

**Monitoring process: How it becomes a management tool in action**

The actual monitoring process can be shaped into a management tool by the judicious choice of indicators. We can illustrate this as we carry our agricultural extension example further. If we replace an indicator such as "number of farmers contacted in quarter/month" by a more meaningful indicator like "purchase of inputs by farmers in an extension area", we should be able to improve the contribution from extension workers, as follows:

1. The extension agents will get the right signal: that the job is not just to "contact" farmers, but to convince them to apply the new package. The agents will focus on results rather than on processes like making contact, distributing publications, and giving lectures or even demonstrations. These are the tools which are expected to use, but not the end product of their efforts. In other words, the effectiveness of the extension system can be judged by monitoring the ends achieved rather than the means to the end.

2. The agents will be freed to concentrate more on results. Using the indicator just suggested, they will be able to fill out their progress
reports seasonally rather than monthly or quarterly, depending on the number of crops produced in a year. For instance, fertilizers can reasonably be expected to be purchased at the time they are to be applied to seasonal crops. The number of reports will thus be greatly reduced, decreasing the administrative burden on extension agents and releasing their time for more intensified field work.

Under such monitoring and evaluation system, the extension agents will be eager to find innovative ways of persuading the farmers. If the package turns out to be ineffective, they will be the first to get worried and provide feedback to management or the agricultural research station. In short, agents will become more alert and sensitive to farmers' reactions, careful about experimental demonstrations or trials, and more conscious of costs and benefits of recommended extension packages. For costs and benefits as perceived by the farmers are what will ultimately determine whether they will adopt extension packages on a continuing basis or not, even though the packages are effective in terms of incremental yields and production. In sum, extension agents will become conscious of the need to monitor their own performance in terms of actual results achieved. This, in the final analysis, is the objective of the Monitoring and Evaluation system.

3. Such self-monitoring should be facilitated by the format of the progress report, which normally has space for comparison with progress of the indicator during a comparable preceding period (IFAD, 1986).
CHAPTER THREE
THE AREA OF THE STUDY

Introduction:

This chapter is intended to provide information about (SPFS) in western Omdurman as background area, target population, programme objectives and strategy.

3.1 Background about the project area:
3.1.1 Location of the project:

The (SPFS) was designed and implemented to improve food security situation through increasing production of food and its stability and safety, and increase the opportunities of access to food through increasing income by adopting the participatory approach and an integrated package of technologies, targeted marginal or disadvantaged groups in rural areas of Umbeda Locality (west Omdurman, Khartoum State) covering the area of Um-Harout I and Um-Harout II villages located in west Omdurman between Longitudes 30° - 31’, 32° - 15’E and Latitudes 16°N. It is situated along the western parts of the White Nile and River Nile and extends westwards to North Kurdofan State and northwards to the southern boundaries of the Northern State.

3.1.2 Land escape:

The land escape of the study area is plain, almost free from any highlands except for some small rocky hills, lying in the western part on the boundaries between Khartoum State and northern of Kurdofan State.

The features of main land have been formed as a result of complex natural processes acting on the geomorphic surfaces. The following geomorphic and drainage systems have contributed mostly to the shaping of the different land surfaces:

a. Wadi Almugadam lower flood plain system and depressions.

b. The River Nile drainage system.

c. Wadi Alugadam drainage system.

d. Plateaus, hills and rocky areas.

e. Drainage channels.

3.1.3 Climate:

The northern and southern parts of west Omdurman lie within the semi-desert climate with summer rains and cool to warm winters. In the
southern parts, the average rainfall ranges between 100 – 225 mm. The mean maximum temperature of the hottest months (May or June) are 40 – 42°C and mean minimum temperatures of the coldest month (January) are 8 – 16°C.

In the northern parts, the rainfall is erratic and in some years there may be no rain at all in some places. The mean annual rainfall is generally below 100 mm, and in all months the average rainfall is less than 20% of the average potential evapotranspiration. The relative humidity of the air is only 25 – 30% throughout the year. The mean maximum temperature of the hottest month (June) is 42 – 44°C, whilst mean temperatures of the coldest month (January) ranges between 8 – 15°C.

3.1.4 Vegetation:

The vegetation of the area is typically of the semi-desert zone, including shrubs on sand soil and some trees like Acacia radiana and A. tortilist. Trees are subjected to fairly high intensity of browsing and have also been cleared for fuel wood and charcoal. Persistent drought and heavy grazing have left the area bare of vegetative cover.

3.1.5 Agriculture:

Agriculture generally is a traditional form of cultivation, which utilized simple technology, a hoe and long wooden pole with sharp edge for planting. This simple technique does not expose the soil to erosive forces. There is also traditional mechanism for allocating land for this activity.

3.1.6 Infrastructures and water resources:
The asphalt road "Shiryan Alshamal" linking Omdurman to Dongla crosses the study area, but the villages lie far away from this vital rout.

Due to the unrelenting harsh arid conditions in the area, all villages have started and grow as clusters of huts and small houses around water points on the Wadi Almogadam banks. Usually the inhabitants depend on Wadi Almogadam water during the normally very short rainy season; but for the rest of the year they rely on wells (Beirs). Most villages are named after the water points (e.g. Beir Ali, Beir Al-Beida, Beir Wad Hasab-alallah …etc). Relatively few villages have some sort of schooling for children but definitely health and other services do not exist. Women are the primary provided of water, for domestic use and for animal use at the household. Water is drawn by donkeys with a pulley and rope, using a goat skin "Dalu" or plastic pot. It is transported back to the household by donkey and stores in goat skin bags "Girba".

3.1.7 Grass root institutions:

The SPFS west Omdurman unit initiated grass-roots institution (or local institution) as village development committees (VDCs) in order to ensure incorporation of the bottom-up and participatory approach in the development process.

3.1.7.1 Village development committees (VDCs):

The village development committee is the basic institution of SPFS. The major responsibilities and functions of VDCs, as stated in the project document (2003), include:

- They are responsible for coordinating and implementing development activities in their respective villages.
- Facilitate the collection and distribution of other communication stems and organize community meeting.
- Participate in planning, implementation, monitoring and evaluation of projects.
- Field operations and water management are carried by other committees such as (farm committee – committee of wells – popular committee). These committee receive training and they work in harmony with each other.

3.1.8 Population:

The number of the population of the area ranges between (9 – 10) thousand. The dominant ethnic groups in the area, however, Hassaniya, Giriat. The Hawaweer is the dominant group in the location, occupying the central part. The Hawaweer claim descent from a single male ancestor known as Malik, who migrated from Saudi Arabia to Egypt to Northern Kordofan and throughout Wadi Al Mugadam. The ethnic groups inhabiting in the area are mainly Hawaweer. Their occupations are agriculture in rainy season. During the other seasons they moved between Wadi Al Mugadam and the Nile to find water and pasture for their livestock.

Presently the majority of tribe resides there a long with the "Nazir" (Paramount Chief), who administers and customary govern all branches of the Hawaweer, wherever they are located.

The tribe is divided into sub-tribes or clans, each founded by one of the sons of Malik, namely Rabab, Hararien Habasab, Salhab, Khamaseen, Fazarab, Mawalkah, Tamasien, Gueirah. The tribal leadership resides in Northern Kordofan, the traditional homeland of the Hawaweer tribe. The customary political organization of the Hawaweer is hierarchical, with authority vested in the Nazir, followed by the
Omadahs, and the Sheikhs who cater for large groups of families line age groups.

Um Harout is the main village along the Wadi and serves as an important administrative center for the Hawaweer and Giriat tribes.

Um Harout tribal court is not permanent, but nevertheless is usually convened every month. It is vested authority by the Nazir to arbitrate in matters of customary law, solving disputes pertaining to livestock, tribal conflict etc. In recent years however the Nazir has reasserted his authority over the sub-tribes in Northern State which continue to be administered under the customary arrangement.

3.2 Program strategy:

The major elements of the strategy proposed for implementation of the (SPFS) activities as indicated in the project document (2001) are:

1. Integration of the various components, in order to secure and stabilize food production and generate new revenues.

2. Participation of the beneficiaries in project identification, implementation, evaluation and monitoring.

3. Set up or strengthen farmer organizations through training, in particular in the management of sustainable mechanism for procurement of inputs to complement the provision of irrigation water at farm level, intensification of crop production and diversification of production.

4. Demonstration of simple, appropriate and accessible technologies in farmers field by farmers themselves.

5. Identification of farmer’s constraints, and search for sustainable solutions to these constraints, allowing wide adoption of the demonstrated technologies.

3.3 The project components and objectives:
According to the final project document (2001) the project components are:

3.3.1 Water control and management:

The main objective of the water control and management component is to increase the water efficiency of the existing or proposed new irrigation schemes by:

- Increasing the water uses at the pumping, distribution and plot levels.
- Improving the water management in order to maximize the water productivity and enhance food security, for the target beneficiaries.

3.3.2 Intensification of plant production systems:

The objectives of the intensification component are:

- Development of participatory process among the beneficiaries and their organizations for the identification, evaluation and monitoring of technological options. Identification of constraints and appropriate solutions to resolve them would ensure widespread adoption of high yielding varieties, integrated plant nutrition system, integrated pest management, sound post harvest techniques and efficient input delivery system.
- Demonstration of available new technologies for boosting food production of the major staple food crops (dura, sorghum, dukhn, etc) in a sustainable way in farmers’ fields. The demonstrations would be carried out by farmers themselves through the mobilization, organization and training of producers for effective use of improved technical packages and practices.
- Improvement of household food security at the Spfs sites.
- Promotion of gender sensitive activities and the furtherance of social equity.

3.3.3 Diversification of production:
The objective of this component is to promote income-generating activities in supporting of the household food security, targeting in particular women. That was to be achieved through the rearing of small short cycle stock (sheep, goats). It is targeted 1500 household representing in total 9000 person.

3.3.4 Constraints analysis:
The constraints analysis consists of several agro-economic studies aimed at identifying constraints in order to identify the constraints to farm level profitability and access to technology, land, inputs, marketing, processing and credit facilities. This provided an adequate feedback on progress and result achieved, identify problems encountered and proposed means of overcoming such problems. The constraints analysis is not an activity in itself, but is an integral part of the components of water control and management, intensification of plant production and diversification of production. It is a continuous activity carried out before, during and after implementation of the activities of three previous components. The constraints analysis component emphasizes participatory approach in identifying the constraints and the appropriate means of intervention to overcome them.

3.4 Project achievements:
According to an evaluation report of the project conducted in 2005, the project has achieved the following successes:
1. Farmer's adoption rate of extension messages.
2. Farmer's participation in the extension activities.
3. Improved access to extension services and inputs to farmers.
4. Adopting the bottom-up approach (PRA), and allow involvement of local people to identify their developmental needs and give them a chance to decide the applicable solutions for the crop production problems and constraints.
5. Extension workers emphasize on personal contact ways of disseminating the extension message and new technologies, through demonstration plots, field visits, extension meetings and field days.
6. Provided crop production advice and farmers training.
7. Improved change on people's attitudes, values and practices in the project area.
8. Capacity building through training workshops, exchange visits and meetings.
9. Improved food and income security of the target group living in the project area.
10. Establishment of the basic infrastructure which leads to agricultural development.
11. SPFS have success in facing the challenge of transformation the beneficiaries from nomads and pastoralist to farmers.

3.5 Project constraints:
The project evaluation report (2005) has pointed out to the following constraints.
1. The project worked in the out skirts of Omdurman, which characterized by high poverty and vulnerable groups who have no
access to resources and basic needs such as health, clean water and sanitation, and educations.

2. Insufficient water for irrigation during the season due to pump break and weak machine maintenance services.

3. Absence of environmental awareness among the participants of the project.

CHAPTER FOUR
Results and Discussion

Introduction:

This chapter presents and shows data analysis, discussion and interpretation of the results obtained from the data collected during the
field work carried out in April 2007. The chapter consists of two main parts; the first shows the main characteristics of the respondents, the second part deals with the impact of the programme on the food security in the study area.

4.1 Socio-economic characteristics of the respondents:

4.1.1 Age structure:

Table (4.1) shows the frequency distribution of respondents according to their age. It indicates that 94.7% of the respondents fall within the age group of 20 – 59 years old. It is also show that 68.9% of the respondents are under 49 years old and represent 72.5 and 65% as participants and non-participants respectively. This result indicates that both groups have gotten a high percentage of economically active population, which facilitates the success and sustainability of the activities introduced by the project.

<table>
<thead>
<tr>
<th>Age group (years)</th>
<th>P</th>
<th></th>
<th>NP</th>
<th></th>
<th>Total</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F</td>
<td>%</td>
<td>F</td>
<td>%</td>
<td>F</td>
<td>%</td>
</tr>
<tr>
<td>20 – 29</td>
<td>3</td>
<td>7.5</td>
<td>2</td>
<td>5.0</td>
<td>5</td>
<td>6.3</td>
</tr>
<tr>
<td>30 – 39</td>
<td>3</td>
<td>7.5</td>
<td>4</td>
<td>10.0</td>
<td>7</td>
<td>8.8</td>
</tr>
<tr>
<td>40 – 49</td>
<td>23</td>
<td>57.5</td>
<td>20</td>
<td>50.0</td>
<td>43</td>
<td>53.8</td>
</tr>
<tr>
<td>50 – 59</td>
<td>10</td>
<td>25.0</td>
<td>11</td>
<td>57.5</td>
<td>21</td>
<td>26.3</td>
</tr>
<tr>
<td>60 – above</td>
<td>1</td>
<td>2.5</td>
<td>3</td>
<td>7.5</td>
<td>4</td>
<td>5.0</td>
</tr>
<tr>
<td>Total</td>
<td>40</td>
<td>100</td>
<td>40</td>
<td>100</td>
<td>80</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: Field Survey (2007)

4.1.2 Level of education:

Table (4.2) shows the frequency distribution of respondents by their level of education. It indicated that 48.8% of the respondents were illiterate, 32.5% attended Khalwa (Quranic School), 17.5% and 1.3% of the respondents received primary and secondary education respectively.
This indicates the widespread of illiteracy in the project area. This is a negative indication in developmental process which undermines their desire to adopt new technologies and innovations. Therefore, more efforts are needed to promote adult education and to address existing high illiteracy rate in the project area.

Table (4.2)
Frequency distribution and percentages of respondents by level of education.

<table>
<thead>
<tr>
<th>Level of education</th>
<th>P</th>
<th>%</th>
<th>NP</th>
<th>%</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Illiterate</td>
<td>10</td>
<td>25</td>
<td>29</td>
<td>72.5</td>
<td>39</td>
<td>48.8</td>
</tr>
<tr>
<td>Khalwa</td>
<td>16</td>
<td>40</td>
<td>120</td>
<td>25</td>
<td>26</td>
<td>32.5</td>
</tr>
<tr>
<td>Primary School</td>
<td>23</td>
<td>14</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>1.3</td>
</tr>
<tr>
<td>Secondary School</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>2.5</td>
<td>1</td>
<td>1.3</td>
</tr>
<tr>
<td>Total</td>
<td>40</td>
<td>100</td>
<td>40</td>
<td>100</td>
<td>80</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: Field Survey (2007)

4.1.3 Marital status:

Table (4.3) shows the frequency distribution of respondents by marital status. It indicates that most of the respondents were married (78.8%) representing 85% and 72.5% as P and NP respectively. The table also shows that 8.8 and 3.8% of the respondents are widow and divorced respectively, who mostly were women households. The table showed that 12.5% of the project participants are single, indicating that they had no responsibilities in their families and they had leisure time. It's possible to make use of their time in the training activities.

Table (4.3)
Frequency distribution and percentages of respondents by marital status.

<table>
<thead>
<tr>
<th>Marital status</th>
<th>P</th>
<th>%</th>
<th>NP</th>
<th>%</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Married</td>
<td>34</td>
<td>85</td>
<td>29</td>
<td>72.5</td>
<td>63</td>
<td>78.8</td>
</tr>
<tr>
<td>Widow</td>
<td>1</td>
<td>2.5</td>
<td>6</td>
<td>15.0</td>
<td>7</td>
<td>8.8</td>
</tr>
</tbody>
</table>
### 4.1.4 Family size:

Table (4.4) shows the frequency distribution of respondents by family size. It indicates that 26.3% of the respondents have family size less than 6 members. However 76.3% of the respondents have family size range between 6 – 10 members. This is mainly because it is observed that most of the respondents have relatives sharing with them food, and accommodation. The table also shows no difference in family size between the participants and non-participants, as 47.5 of the project participants have family size of 6 – 10 members compared to 52.5% of non-participants. Those who have family size of more than 10 members amount to 22.5% as participants (p) and 25% as none-participants(NP) respectively.

#### Table (4.4)

**Frequency distribution and percentages of respondents by family size.**

<table>
<thead>
<tr>
<th>Family size</th>
<th>P</th>
<th>NP</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F</td>
<td>F</td>
<td>F</td>
</tr>
<tr>
<td>Less than 6 members</td>
<td>12</td>
<td>9</td>
<td>21</td>
</tr>
<tr>
<td>6 – 10 members</td>
<td>19</td>
<td>21</td>
<td>40</td>
</tr>
<tr>
<td>More than 10 members</td>
<td>9</td>
<td>10</td>
<td>19</td>
</tr>
<tr>
<td>Total</td>
<td>40</td>
<td>40</td>
<td>80</td>
</tr>
</tbody>
</table>

Source: Field Survey (2007)

### 4.1.5 Main occupation:

Table (4.5) shows the frequency distribution of the participants by main occupation before and after the project intervention. It indicates that before the project 25%, 50%, 10% and 15% were farmers, pastoralist,
traders and others (e.g. well digging) respectively. This situation has changed after project intervention as the percentage of pastoralist has dropped from 50% to 7.5%. On the other hand the number of farmers have increased from 25 to 85%. This change in occupation indicates that the project has changed the participants from pastoralist to farmers and/or agro-pastoralists and promoted them to get involved in better income-generating opportunities. It is observed that the project succeeded in the transformation of nomads and pastoralist into settled farmers. It is observed that considerable number of inhabitants P&NP who practice animal production as main economic activity are replaced it by field crop production and a set of non- farm jobs created the project. Several individual project participants have many successful stories which indicates the project impact in transformation of nomads into farmers or agro-pastoralists. Mohammed Ahmed (one of the project participants) had comment that: "in the past my occupation is looking for pasture and water for our livestock specially during the rainy season. Now I acquired a knowledge and skills which enabled me to have other job to gain money to meet my family basic needs"

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Before the project</th>
<th>After the project</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>10 : 25</td>
<td>34 : 85.0</td>
<td>44 : 55.0</td>
</tr>
<tr>
<td>Pastorlism</td>
<td>20 : 50</td>
<td>3 : 7.5</td>
<td>23 : 28.8</td>
</tr>
<tr>
<td>Trade</td>
<td>4 : 10</td>
<td>3 : 7.5</td>
<td>7 : 8.8</td>
</tr>
<tr>
<td>Others</td>
<td>6 : 15</td>
<td>- : -</td>
<td>6 : 7.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>40 : 100</strong></td>
<td><strong>40 : 100</strong></td>
<td><strong>80 : 100</strong></td>
</tr>
</tbody>
</table>

Source: Field Survey (2007)

4.2 SPFS Impact:

4.2.1 Income level:

Table (4.6) shows the frequency distribution of respondents by income category. It revealed that 5% of participants and 15% of non-
participants have an income level of less than 1000 Sudanese pounds (SG) per month, there are 62.5% and 37.5% as P and NP have the income level of more than SG 3000 per month. This indicates that participants have achieved higher income levels compared to NP. This result reflects the positive impact of the project interventions in raising household income. Respondents representing project participants confirmed that activities provided by the project have enabled them to increase their income level and improve their living standards. Moreover, it is observed that the participants have achieved higher income levels and better food intake both in terms of quantity (number of meals per-day) and quality (diet composition), while the non-project participants reported to have achieved less income and low food quantity and quality which consider as the main factor affecting nutritional status. This result indicates positive effect of the project on the food availability in terms of quantity and quality which is essential to household food security. From the interview and group discussion it is appear that the participants have used the higher income level to cover their immediate food needs, as first priority of income expenditure followed by household furniture and clothes.

Table (4.6) shows the frequency distribution of respondents by income levels.

<table>
<thead>
<tr>
<th>Income level</th>
<th>P</th>
<th>NP</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F</td>
<td>%</td>
<td>F</td>
</tr>
<tr>
<td>Less than 10,000</td>
<td>2</td>
<td>5.0</td>
<td>6</td>
</tr>
<tr>
<td>10,00-19.99</td>
<td>3</td>
<td>3.8</td>
<td>4</td>
</tr>
<tr>
<td>20,00-29.99</td>
<td>10</td>
<td>25.0</td>
<td>15</td>
</tr>
<tr>
<td>3000 and over</td>
<td>25</td>
<td>62.5</td>
<td>15</td>
</tr>
<tr>
<td>Total</td>
<td>40</td>
<td>100</td>
<td>40</td>
</tr>
</tbody>
</table>

Source: Field Survey (2007)

4.2.2 Participation and community organizations:

Table (4.7) shows the frequency distribution of respondents by participation in community organizations. It indicates that 98% of the respondents participate in different project committees. Reasons behind
participation of respondents are mainly attributed to the use of participatory approach adopted by the program to enable the beneficiaries to participate effectively in the process of their development in sustainable manner.

Table (4.8) shows that 47.5% of participants participating in cooperative society, 41.3% of participants in water committee, 10.0% of participants in popular committees and only 1.3% of respondents participate in development committees.

Table (4.7)
Frequency distribution and percentages of respondents by their participation in development committees

<table>
<thead>
<tr>
<th>Participating</th>
<th>P</th>
<th>%</th>
<th>NP</th>
<th>%</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>YES</td>
<td>39</td>
<td>97.5</td>
<td>40</td>
<td>100</td>
<td>79</td>
<td>98.8</td>
</tr>
<tr>
<td>NO</td>
<td>1</td>
<td>2.5</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>1.2</td>
</tr>
<tr>
<td>Total</td>
<td>40</td>
<td>100</td>
<td>40</td>
<td>100</td>
<td>80</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: Field Survey (2007)

Table (4.8)
Frequency distribution and percentages of respondents by membership in committees

<table>
<thead>
<tr>
<th>Classification</th>
<th>P</th>
<th>%</th>
<th>NP</th>
<th>%</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>15</td>
<td>37.5</td>
<td>18</td>
<td>45.0</td>
<td>33</td>
<td>41.3</td>
</tr>
<tr>
<td>Popular</td>
<td>5</td>
<td>12.5</td>
<td>3</td>
<td>7.5</td>
<td>8</td>
<td>10.0</td>
</tr>
<tr>
<td>Cooperative</td>
<td>19</td>
<td>47.5</td>
<td>19</td>
<td>47.5</td>
<td>38</td>
<td>47.5</td>
</tr>
<tr>
<td>Development</td>
<td>1</td>
<td>2.5</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>1.3</td>
</tr>
<tr>
<td>Total</td>
<td>40</td>
<td>100</td>
<td>40</td>
<td>100</td>
<td>80</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: Field Survey (2007)

4.2.3 Access to extension service:

Table (4.9) shows the frequency distribution of respondents by access to project extension service. It indicates that all the respondents (as participant and none-participant) comment that they have access to
agricultural services. Such services include preparing of land, improved seeds, cultivation methods, irrigation as indicated in table (4.10).

### Table (4.9)

**Frequency distribution and percentages of respondents by access to extension service.**

<table>
<thead>
<tr>
<th>Access to extension service</th>
<th>P</th>
<th>NP</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F percentages</td>
<td>F percentages</td>
<td>F percentages</td>
</tr>
<tr>
<td>Yes</td>
<td>40 100%</td>
<td>40 100%</td>
<td>80 100%</td>
</tr>
<tr>
<td>No</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>40 100%</td>
<td>40 100%</td>
<td>80 100%</td>
</tr>
</tbody>
</table>

Source: Field Survey (2007)

### Table (4.10)

**Frequency distribution and percentages of respondents by type of services received.**

<table>
<thead>
<tr>
<th>Type of services received</th>
<th>P</th>
<th>NP</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F percentages</td>
<td>F percentages</td>
<td>F percentages</td>
</tr>
<tr>
<td>Preparing land</td>
<td>40 100%</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Improved seeds</td>
<td>40 100%</td>
<td>40 100%</td>
<td>80 100%</td>
</tr>
<tr>
<td>Irrigation method</td>
<td>40 100%</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>40 100%</td>
<td>40 100%</td>
<td>80 100%</td>
</tr>
</tbody>
</table>

Source: Field Survey (2007)

**4.2.4 Source of crop production inputs:**

Table (4.11) shows the frequency distribution of respondents by source of crops production inputs. It indicates that most of participants and non-participants as 92.5% and 100% respectively are used to take crops inputs from SPFS. This reflects the wide contact of respondents with SPFS team and their access to project offering.

### Table (4.11)

**Frequency distribution and percentages of respondents by sources of production inputs.**

<table>
<thead>
<tr>
<th>Sources of inputs</th>
<th>P</th>
<th>NP</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F percentages</td>
<td>F percentages</td>
<td>F percentages</td>
</tr>
<tr>
<td>SPFS</td>
<td>40 100%</td>
<td>37 92.5%</td>
<td>77 96.3%</td>
</tr>
<tr>
<td>Local market</td>
<td>-</td>
<td>3 7.5%</td>
<td>3 3.8%</td>
</tr>
<tr>
<td>Other</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>40 100%</td>
<td>40 100%</td>
<td>80 100%</td>
</tr>
</tbody>
</table>

Source: Field Survey (2007)

**4.2.5 The benefit from the different SPFS extension packages:**

Table (4.12) shows the frequency distribution of respondents by the benefit from the different SPFS extension packages. It indicates that many extension packages were extended by the SPFS. The most popular
extension packages are watermelon and cucumber extension to the participants group (for use cultivation method and irrigation method) as 92.5 and 85% respectively as shown in the table (4.12).

Table (4.12)
Frequency distribution and percentages of respondents by extent of perception of benefit received from SPFS extension packages.

<table>
<thead>
<tr>
<th>Extension packages</th>
<th>Group</th>
<th>Benefit</th>
<th></th>
<th>No benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>N</td>
<td>%</td>
<td>N</td>
</tr>
<tr>
<td>Abu Sabaeen extension package for improved seed</td>
<td>1*</td>
<td>32</td>
<td>80.0</td>
<td>8</td>
</tr>
<tr>
<td>Abu Sabaeen extension package for use cultivation method</td>
<td>1</td>
<td>32</td>
<td>80.0</td>
<td>8</td>
</tr>
<tr>
<td>Abu Sabaeen extension package for use of irrigation method</td>
<td>1</td>
<td>32</td>
<td>80.0</td>
<td>8</td>
</tr>
<tr>
<td>Watermelon extension package for improved seed</td>
<td>1</td>
<td>30</td>
<td>75</td>
<td>10</td>
</tr>
<tr>
<td>Watermelon extension package for use cultivation method</td>
<td>1</td>
<td>37</td>
<td>92.5</td>
<td>3</td>
</tr>
<tr>
<td>Watermelon extension package for use irrigation method</td>
<td>1</td>
<td>37</td>
<td>92.5</td>
<td>3</td>
</tr>
<tr>
<td>Okra extension package for improved seed</td>
<td>1</td>
<td>34</td>
<td>85.0</td>
<td>6</td>
</tr>
<tr>
<td>Okra extension package for use cultivation method</td>
<td>1</td>
<td>33</td>
<td>82.5</td>
<td>7</td>
</tr>
<tr>
<td>Okra extension package for use irrigation method</td>
<td>1</td>
<td>33</td>
<td>82.5</td>
<td>7</td>
</tr>
<tr>
<td>Cucumber extension package for improve seed</td>
<td>1</td>
<td>35</td>
<td>87.5</td>
<td>5</td>
</tr>
<tr>
<td>Cucumber extension package for cultivation methods</td>
<td>1</td>
<td>34</td>
<td>85</td>
<td>6</td>
</tr>
<tr>
<td>Cucumber extension package for irrigation method</td>
<td>1</td>
<td>35</td>
<td>87.5</td>
<td>5</td>
</tr>
</tbody>
</table>

Source: Field Survey (2007)
*1= participants group

4.2.6 The benefit from the adoption of different extension packages:

Table (4.13) shows the effect of adoption of different extension packages. It reveals that low adoption rates were achieved for Okra extension packages (improved seed, cultivation method and irrigation methods). Adoption rates of the recommended production packages of the other three crops (watermelon, Abu Sabaeen and cucumber) are very high as 82.5%, 92.5%, 85.0% and 87.5 respectively.
Frequency distribution of respondents by extent of perception adoption of different components extension packages.

<table>
<thead>
<tr>
<th>Extension packages</th>
<th>Adoption</th>
<th>No adoption</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adoption of improved seed of Abu Sabaeen</td>
<td>34</td>
<td>6</td>
</tr>
<tr>
<td>Adoption of Abu Sabaeen cultivation method</td>
<td>34</td>
<td>6</td>
</tr>
<tr>
<td>Adoption of Abu Sabaeen irrigation method</td>
<td>34</td>
<td>6</td>
</tr>
<tr>
<td>Adoption of watermelon improved seed</td>
<td>37</td>
<td>3</td>
</tr>
<tr>
<td>Adoption of watermelon cultivation method</td>
<td>37</td>
<td>3</td>
</tr>
<tr>
<td>Adoption of watermelon irrigation method</td>
<td>37</td>
<td>3</td>
</tr>
<tr>
<td>Adoption of okra improved seed</td>
<td>33</td>
<td>7</td>
</tr>
<tr>
<td>Adoption of okra cultivation method</td>
<td>33</td>
<td>7</td>
</tr>
<tr>
<td>Adoption of okra irrigation method</td>
<td>36</td>
<td>4</td>
</tr>
<tr>
<td>Adoption of cucumber improved seed</td>
<td>35</td>
<td>6</td>
</tr>
<tr>
<td>Adoption of cucumber cultivation method</td>
<td>34</td>
<td>6</td>
</tr>
<tr>
<td>Adoption of cucumber irrigation method</td>
<td>36</td>
<td>4</td>
</tr>
</tbody>
</table>

Source: Field Survey (2007)

4.2.7 Sufficiency of product available for family consumption:

Table (4.14) shows the frequency of respondents by sufficiency of product available for family consumption from crop production. It indicates that 76.3% of the respondents had comment that they used to consume sufficient amount of the crops production as 82.5 and 70.0% for the participants (P) and non-participants (NP) respectively.

Table (4.14)

<table>
<thead>
<tr>
<th>Consumption</th>
<th>P</th>
<th>NP</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F</td>
<td>%</td>
<td>F</td>
</tr>
<tr>
<td>Yes</td>
<td>33</td>
<td>82.5</td>
<td>28</td>
</tr>
<tr>
<td>No</td>
<td>7</td>
<td>17.5</td>
<td>12</td>
</tr>
<tr>
<td>Total</td>
<td>40</td>
<td>100</td>
<td>40</td>
</tr>
</tbody>
</table>

Source: Field Survey (2007)

4.2.8 Opinion about the extension service introduced by the program:

Table (4.15) shows the frequency distribution of respondents by opinion about the extension service introduced by the program. It shows
that 2.5% of respondents indicated that the extension service was weak, while 47.5% of them concluded that it was good, while 40% of them confirmed it was excellent.

<table>
<thead>
<tr>
<th>Table (4.15)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency distribution and percentages of respondents by opinion about the extension service introduced by SPFS</td>
</tr>
<tr>
<td>Variable</td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td>Week</td>
</tr>
<tr>
<td>Medium</td>
</tr>
<tr>
<td>Good</td>
</tr>
<tr>
<td>Excellent</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

Source: Field Survey (2007)

4.2.9 Contribution of project in improving food and income security:

Table (4.16) shows the frequency distribution of respondents contribution of project in improving food and income security. It indicates that 75% of the respondents have confirmed that income-generating activities (IGAs) and intensification of crops production they receive have contributed in improving their household income and food security.

The remaining 25%, who didn't achieve food and income security, attributed that to the overgrazing, disruption in water supply service and lack of protection fence.

<table>
<thead>
<tr>
<th>Table (4.16)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency distribution and percentages of respondents by contribution of project in improving food and income security.</td>
</tr>
<tr>
<td>Contribution</td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>No</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

Source: Field Survey (2007)

4.3 Results of T-test of significant of the observed difference between (P) and (NP) in SPFS in term of income before and after programme introduction:

4.3.1 Income before programme:
Table (4.17) shows that there was significant difference between the two groups in term of income before programme.

4.3.2 Income after programme:

Table (4.17) shows that there was significant difference between participants and non-participants group in term of income after programme. This result indicated that the SPFS succeeded in increasing the income for the beneficiaries.

**Table (4.17)**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Group</th>
<th>Mean Score</th>
<th>Std dev</th>
<th>Mean dif</th>
<th>Std error dif</th>
<th>t</th>
<th>Sig .002</th>
</tr>
</thead>
<tbody>
<tr>
<td>Income before programme</td>
<td>*1</td>
<td>203.50</td>
<td>134.480</td>
<td>21.263</td>
<td>87.500</td>
<td>3.680</td>
<td>.002</td>
</tr>
<tr>
<td></td>
<td>*0</td>
<td>116.00</td>
<td>67.284</td>
<td>10.639</td>
<td>87.500</td>
<td>3.680</td>
<td>.005</td>
</tr>
<tr>
<td>Income after programme</td>
<td>1</td>
<td>400.95</td>
<td>221.723</td>
<td>35.058</td>
<td>245.950</td>
<td>6.013</td>
<td>.005</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>155.00</td>
<td>133.244</td>
<td>21.068</td>
<td>245.950</td>
<td>6.013</td>
<td>.005</td>
</tr>
</tbody>
</table>

Source: Field Survey (2007)

*1 = P  *0 = NP

4.4 Result of T-test analysis:

Result of T-test of significance of the observed different between participants and non participants in SPFS in term of selected variables.

4.4.1 Total production:

4.4.1.1 Total production of Abusabeen:

Table (4.18) shows that there was a significant difference between participants and non-participants in term of total production of Abusabeen. The mean scores for participants 175.18 and 58.43 for non-participants with t-value 3.85.

4.4.1.2 Total production from watermelon:

Also table (4.18) revealed that there was a significant difference between participants and non participants in term of total production of watermelon. The mean scores for participants is 152.03 and 43.70 for the non-participants group with a t-value 3.39.

4.4.1.3 Total production from okra:
Table (4.18) reflected that there was a significant difference between participant and non-participants in term of total production of okra. The mean scores for two groups is 25131.20 and 26.95 respectively with a t-value 1.004.

4.4.1.4 Total production from cucumber:

Table (4.18) shows that there was significant difference between participants and non-participants in term of total production of cucumber. The mean scores for participants is 165.68 and 28.00 for the non-participants group with a t-value 6.068.

4.4.2 Consumption from crops under cultivation:

4.4.2.1 Consumption from Abusabaeen production:

As in Table (4.18) T-test result indicates that there was significant difference between participants and non-participants group. This result reflects that participants group consumed more from Abusabeen production than the non-participants group.

4.4.2.2 Consumption from watermelon production:

Table (4.18) revealed that there was significant difference between two groups. With respect to their mean scores, which is 54.45 for the participants group and 15.65 for the non-participants group, with a T-value 3.789 so it was significant at ,000 level.

4.4.2.3 Consumption from cucumber production:

There is a significant difference between the participants and non-participants group. With respect to their mean scores, which is 53.55 for the participants group and 13.25 for the non-participants group, with a T-value 4.716 so it was significant at ,000 level.

4.4.3 Net income from crops under cultivation:

4.4.3.1 Net income from Abusabaeen production:
There is a significant difference between two groups. With respect to their mean scores, which is 121.25 for the participants group and 33.63 for the non-participants group, with a t-value 3.812 so it was significant at 0.000 level.

4.4.3.2 Net income from watermelon production:
Table (4.18) shows that there is a significant difference between participants and non-participants group. With respect to their mean scores, which is 90.05 for the participants group and 28.05 for the non-participants group, with a t-value 2.984 so it was significant at 0.000 level.

4.4.3.3 Net income from okra production:
Table (4.18) revealed that there is a significant difference between two groups. With respect to their mean scores, which is 106.55 for the participants group and 12.30 for the non-participants group, with a T-value 3.130 so it was significant at 0.000 level.

4.4.3.4 Net income from cucumber production:
Table (4.18) shows that there is a significant difference between two groups. With respect to their mean scores, which is 100.53 for the participants group and 14.75 for the non-participants group, with a T-value 5.951 so it was significant at 0.000 level.

4.4.3.5 Net farm income:
Table (4.18) shows that there is a significant difference between participants and non-participants groups. With respect to their mean scores, which is 418.3750 for the participants group and 88.7250 for the non-participants group, with a T-value 6.207 so it was significant at 0.000 level.

Table (4.18):
Results of t-test for participants and non-participants in SPFS in term of selected variables

59
### Variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>Group</th>
<th>Mean Score</th>
<th>Std dev</th>
<th>Mean dif</th>
<th>Std error dif</th>
<th>t</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Production of Abu Sabaeen</td>
<td>1</td>
<td>175.18</td>
<td>58.43</td>
<td>116.75</td>
<td>29.296</td>
<td>116.75</td>
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<tr>
<td></td>
<td>0</td>
<td>58.43</td>
<td>47.86</td>
<td>116.75</td>
<td>7.571</td>
<td>116.75</td>
<td>.000</td>
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<tr>
<td>Total Production of Watermelon</td>
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<td>189.28</td>
<td>69.63</td>
<td>116.75</td>
<td>29.296</td>
<td>116.75</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>189.28</td>
<td>69.63</td>
<td>116.75</td>
<td>7.571</td>
<td>116.75</td>
<td>.000</td>
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<tr>
<td>Total Production of Okra</td>
<td>1</td>
<td>25131.20</td>
<td>158125.140</td>
<td>25104.250</td>
<td>25001.780</td>
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<td>30.771</td>
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<td>Total Production of Cucumber</td>
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<td>141.355</td>
<td>24.732</td>
<td>137.675</td>
<td>3.911</td>
<td>137.675</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>141.355</td>
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<td>137.675</td>
<td>3.911</td>
<td>137.675</td>
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<td>Consumption of Abu Sabaeen</td>
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<td>18.252</td>
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<td>45.500</td>
<td>.000</td>
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<td>64.890</td>
<td>18.252</td>
<td>45.500</td>
<td>9.581</td>
<td>45.500</td>
<td>.000</td>
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<td>2.886</td>
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<td>38.800</td>
<td>2.886</td>
<td>38.800</td>
<td>.000</td>
</tr>
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<td>Consumption of Okra</td>
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<td>13.25</td>
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<td>52.832</td>
<td>8.353</td>
<td>52.832</td>
<td>.000</td>
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<tr>
<td>Net Income from Abu Sabaeen</td>
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<td>141.466</td>
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<td>Net Income from Watermelon</td>
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<td>28.05</td>
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<td>19.227</td>
<td>121.604</td>
<td>.000</td>
</tr>
<tr>
<td></td>
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<td>28.05</td>
<td>49.834</td>
<td>121.604</td>
<td>7.879</td>
<td>121.604</td>
<td>.000</td>
</tr>
<tr>
<td>Net Income from Okra</td>
<td>1</td>
<td>94.250</td>
<td>28.05</td>
<td>94.250</td>
<td>19.227</td>
<td>94.250</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>0</td>
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<td>25.300</td>
<td>94.250</td>
<td>4.000</td>
<td>94.250</td>
<td>.000</td>
</tr>
<tr>
<td>Net Income from Cucumber</td>
<td>1</td>
<td>90.05</td>
<td>12.30</td>
<td>85.775</td>
<td>14.209</td>
<td>85.775</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>12.30</td>
<td>25.300</td>
<td>85.775</td>
<td>4.000</td>
<td>85.775</td>
<td>.000</td>
</tr>
<tr>
<td>Net Farm Income</td>
<td>1</td>
<td>188.766</td>
<td>106.55</td>
<td>188.766</td>
<td>29.847</td>
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<td>.000</td>
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<td>.000</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 4.5 Situational Analysis of the Area:

The observation, interviews and group discussion with the respondents indicate that target group in the west Omdurman live in extremely poor conditions. The respondents were asked to identify the key problems they faced in their daily existence in the area, the main problems identified ranked is the high rate of illiteracy, spread of diseases, water and sanitation.

The health problems faced by people in project area are many and are due to complex combination of poor nutrition, major causes of morbidity consistently reported at health facilities are Malaria. Acute respiratory infections and eye infections. However, the sanitation is very poor in the project area. There is no water services, which results in the spread of Malaria and other diseases, especially during the rainy season.
The main source of water in the project area is groundwater wells. Water is drawn by donkeys with a pulley and rope, using a goat skin (Dalu) or plastic pot. It is transported to the household by donkey, and stored in goat skin bags (Girba). Moreover, it is observed that, there are no social centers or center for illiteracy removal.

4.6 Problems:

Problems facing the project as indicated by the participating respondents are ranging from overgrazing, lack of protection fence, disruption in water supply services. It is also observed that the project area is suffering from on-going desertification intensified by consecutive drought.
5.1 Conclusions:

This study was conducted to investigate to what extent that SPFS has succeeded to attain its prescribed objectives of achieving food and income security in the study area, (west Omdurman, Khartoum State).

To attain the objective of this study both primary and secondary data were collected and used. The primary data were obtained through the field survey by means of use of interview schedule (questionnaire), observation and group discussion. The secondary data were collected from the thesis, books, reports, papers, and other relevant sources. Simple random sampling procedure was used to select 80 respondents (40 participants and 40 non-participants) from two sampled villages using table of random numbers.

The study finding indicates that:

- Most of the respondents are economically active (94.7%) and fall in age group (20 – 59).

- About Seventy six percent of respondents have family size range between 6 – 10 members.

- Marital status analysis of the respondents shows that 78.8% of them are married, 8.8% widows and 8.8% divorced. This indicates that most of the respondents have family obligations and responsibilities.

- Twenty five percent of the participants compared to 72.5% as non-participants undermined their desire to adopt new technologies and innovations and hence more efforts are needed to promote adult education and to address existing high illiteracy rate in the project area.
- Ninety eight percent of participants participate in committees. This is mainly attributed to participatory approach adopted by the program.

- The project contributed more improvement in access to extension service, access to project inputs crop extension, adoption of crop extension packages.

- Extension package and inputs of production provided by the project have contributed positively in adopting new technologies and increasing crops production or net income of the farm.

- SPFS had succeeded to generate positive perception of benefit from use the extension package of Abu Sabaeen, watermelon, okra and cucumber, or improvement of watermelon and cucumber food status among target group.

- Ninety six percent of the respondents are used to have crop inputs from SPFS. This indicate their contact with extension sources. Extension office (SPFS) is the most popular source of information. This means that, farmers have high exposure to interpersonal information sources and low level of exposure to mass media.

- Seventy six percent of respondents had used sufficient amounts from crops production.

- The project has succeeded in improving income and food security of the target group.

- The study revealed that there are some problems associated with implementation of the project which include lack of protection fence, disruption in water supply services and overgrazing which hindered some participants to enjoy the project benefits.
5.2 Recommendations:

The study proposed the following recommendations:

- Expansion and replication of the existing project activities to include more people in the project area, with special emphasis on income-generating activities.

- Promotion and improvement of adult education to address the existing high illiteracy rate in the project area especially among the non-participants.

- Raise environmental awareness among the respondents especially women in order to take into consideration the environmental impact and the relationship between environment and poverty.

- More efforts are needed to provide and improve health facilities and environmental health condition in the project area.

- Provision and improvement of clean water transport and storage containers.

BIBLIOGRAPHY


Ministry of Agriculture and Forestry (Feb.1989), ten-year plan of Action in women in Agriculture and food security. Khartoum, Sudan.


