UNIVERSITY OF CAPE COAST

STATISTICAL JUDGEMENT INTO SELECTION OF SOCIAL DEVELOPMENT PROJECTS

ALEXIS ABAJE ABATEY

2009

UNIVERSITY OF CAPE COAST

STATISTICAL JUDGEMENT INTO SELECTION OF SOCIAL DEVELOPMENT PROJECTS

BY

ALEXIS ABAJE ABATEY

Dissertation submitted to the Department of Mathematics & Statistics
of the School of Physical Sciences, University of Cape Coast,
in partial fulfilment of the requirements for the award of
Master of Science Degree in Statistics

DECEMBER 2009

DECLARATION

Candidate's Declaration

I hereby declare that this dissertation is the result of my own original work and that no part of it has been presented for another degree in this university or elsewhere.

Candidate's Signature: ..... Date: .....

Name: ALEXIS ABAJE ABATEY

Supervisor's Declaration

I hereby declare that the preparation and presentation of the dissertation were supervised in accordance with the guidelines on supervision of dissertation laid down by the University of Cape Coast.

Supervisor's Signature: ..... Date: .....

Name: PROFESSOR KAKU SAGARY NOKOE

ABSTRACT

The study was to determine beneficiary community members' expectation of the benefits of social development projects in Education Rights, Gender and Women's Rights and Food Rights. Sixteen criteria were gotten, initially, using participatory rural appraisal. These were included in the basic information section of a questionnaire. The questionnaire also sought classification and identification information of respondents. It was administered to one hundred respondents selected through purposive sampling to ensure equal representation from identifiable sections of the entire population, in twenty communities.

Factor analysis of the data has identified a four factor solution that underlies decisions for project selection. The first most important factor is economic empowerment. The second most important factor is education. The other two factors which cannot be ignored are quality of life and social empowerment.

ACKNOWLEDGEMENTS

I am grateful to Professor Kaku Sagary Nokoe, PhD, FGA, Faculty of Mathematical Sciences, University for Development Studies, Ghana and Biometrician & Coordinator, Cross Site Research Support Team, FARA SSA_CP, for providing supervision for this work.

I thank Catherine Kampey Abatey (Mrs.), my mother, for the encouragement to do this work, well and finish it.

I appreciate the time community members made available for community discussions to arrive at the initial set of sixteen criteria for selection of projects and I thank the 100 respondents for providing information to make the statistical analysis possible.

DEDICATION

To the Memory of My Mother and My Father.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ACRONYMS

AAG	ActionAid Ghana
CEPA	Centre for Policy Analysis
CSP	Country Strategy Paper
EFA	Education for All
FAO	Food and Agriculture Organisation
GLSS	Ghana Living Standards Survey
GoG	Government of Ghana
GSS	Ghana Statistical Service
ILO	International Labour Organization
NDPC	National Development Planning Commission
NGO	Non Governmental Organization
SPSS	Statistical Package for Social Scientists
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Programme
UNESCO	United Nations Education Science and Cultural Organisation.
UNFPA	United Nations Fund for Population Activities
UNHCR	United Nations High Commissioner for Refugees
UNICEF	United Nations Children's Fund
WFP	World Food Programme

CHAPTER ONE

INTRODUCTION

Background

The world today is characterized by increasing extremes of wealth and poverty. The international economic order has for centuries ensured that the poor get poorer and the rich get richer. The General Agreement on Trade and Tariffs (GATT) and World Trade Organization (WTO) agreements have left agriculture policies of developing nations in the hands of all powerful western nation states who decide on the fate of the rural farmer and his or her family. The developing nation farmer continues to suffer unequal treatment at the global, national and local level. 'Southern' farmers continue to purchase fertilizer and agricultural inputs at non subsidized prices unlike their 'northern' counterparts. This is one of the deep structural issues of poverty which prevents a large proportion of the world from eating, meeting basic needs and sustaining themselves.

Another devastating global trend today is the denial of basic education to 800 million children (ActionAid Ghana Country Strategy Paper Three [AAG CSP III], 2005) and the large numbers of rural children who continue to be denied quality education. No developing country can compete on the global market while large masses of its population remain illiterate. In 1957 Ghana was considered one of the most developed countries in Africa in terms of income and infrastructure. Economic growth continued into the early 1970s, but political

instability and unfavorable external terms of trade, coupled with severe famine and drought led to a devastating recession in the late 1970s. Ghana's development context has been characterized by tremendous upheaval, transition and change. Today, the gap between the rich and the poor as well as between urban and rural communities is widening and becoming increasingly visible. Increasingly there is a flight of rural youth into the cities in search of employment, further education and a better life. Part of the fall out of a poor social and economic support system for the poor, particularly in the rural and deprived regions of Ghana, is the impact it has had on the education sector. This has a telling effect on our efforts, as a country, to meet the Education for All (EFA) targets particularly in relation to achieving basic literacy, numeracy, enrolment, retention and completion rates among children.

All regions of Ghana experience varied forms of poverty. Poverty is greatest in the rural savannah area. This area, where the programme of ActionAid Ghana (AAG) for this study is located, together with rural forest areas accounts for over 60% of total poverty. More than 70% of people in the three northern administrative regions of Ghana live below the poverty line (Ghana Statistical Service [GSS], 2000). Increasing evidence from the Ghana Living Standards Surveys, over the years, suggests that poverty in Ghana is caused by poor agricultural practices and further deepened by the inability of subsistence agro based activities to release the poor from the poverty cycle. A key cause of poverty in Ghana has also been the powerlessness and lack of voice of people living in

poverty to influence public policy and decisions that affect their livelihoods and well being.

Agriculture and Food Security

Ghana's agricultural sector is a major employer providing livelihoods for about 60% of the rural population. Rural subsistence farmers are geographically dispersed making it difficult and expensive to provide support services and innovative approaches to farmers. The sector has therefore suffered from low production, falling short of the projected economic growth targets of 4% - 6%. (National Development Planning Commission [NDPC], 1995). The combined effect of low commodity prices on the world market, conflict and in some places harsh environmental conditions has caused food insecurity. Agriculture will remain the principal sector for development and growth for a long time to come.

Education

One of the structural causes of poverty which needs to be addressed is the poor quality of basic education experienced in rural areas. According to Ghana's yearly national Criteria Reference Test (CRT), from 1990 to 2004, less than 10% of Ghanaian children were able to read and write after completing six years of primary schooling. These low levels of achievement are due to a number of factors including widespread poverty that limits access to education, parental neglect and indifference by parents towards poor quality education, lack of teaching and learning materials, lack of and poor infrastructure and insufficient teachers. Other prominent features are low teacher morale because of absence of a comfortable teaching and learning environment. Traditional and social customs

such as early marriage, child fostering and preference for boys' education continue to restrict many girls from entrance, retention and transition through the education system particularly in the northern regions of Ghana.

In spite of the many efforts by government and donor agencies, a large proportion of children in Ghana never enter the formal school system or complete primary six. The poor quality of education delivered in most communities is a major inequity, which remains unchecked. High levels of out-of-school children are reflected in the extremely high levels of adult illiteracy.

The Government has set up a legal and fiscal environment for Non Governmental Organizations (NGOs) in the country. The legislative framework for NGOs includes legal governance and the fiscal framework includes tax exemption for goods and equipment imported into the country by NGOs for relief or development purposes.

Area of Study

Tamale metropolitan assembly area is located in the mid section of Ghana. Tamale is the third largest city in the country and the most important city in northern Ghana, lying on the main road towards Burkina Faso. The communities in this study, though located close to the metropolis, are rural in nature, and do not benefit from social services like water and electricity. People living in these communities are mainly subsistence farmers. The environment they face is a harsh one with a rainy season lasting five months, from late May to early October. Rainfall is erratic and often comes in torrents, especially in August when it is most damaging for crops in the area. The long dry season from October to May

brings very high day time temperatures and cold nights, especially between November and February when the North-East trade winds set in. These dry and sandy winds, called the harmattan, blow from the Sahara desert. The rapid urbanization of Tamale has created pressure on land. Farmland, which already has poor fertility, is increasingly being taken up by the expanding city and is now inadequate to meet the needs of subsistence farming households. The amount of rainfall recorded annually varies between 750 mm and 1050mm (ActionAid Ghana, 1998).

The total population of the Tamale area is 291,328 people. Here, 38.2% of the labour force category is not active. The housing stock in Tamale is 26,700 and 48.7% of the population live in mud houses while 58.5% of households have access to electricity. Only 12.0% of the communities have a local hospital. Only 22% of households have standpipes either inside or outside the house. Many communities do not have a Junior Secondary School (JSS) complement for their primary schools and therefore for many pupils, the primary school is the highest level of education achieved. The proportion of households headed by females in Tamale is 20.10 % and the average household size is 6.50. For religious affiliation, 13.7% of the people are Christian, 84.0% are Muslim, 1.6% are traditionalists and 0.7% have no affiliation with any organized religion (GSS, 2005).

Statement of the Problem

Underdevelopment is associated with reduced decision making power, little freedom of choice in production, consumption, and employment and limited

socio political representation (ActionAid Ghana Country Strategy Paper One [AAG CSP I], 1995). Others include inadequate access to and control over income generating resources and assets, attitudes of dependency and a history of top-down approaches to development. Illiteracy makes disadvantaged groups even more powerless. Injustice, including some cultural practices and beliefs that promote social injustice and poverty, e.g. land rights of women and migrants are another important contributory factor to underdevelopment. Concentration of social services and infrastructure in urban areas to the detriment of rural areas promotes inequity. Underdevelopment is also characterized by the following: non-participation in decision making at household and community level and beyond, poor understanding of available options, a general unorganized state of affairs, political passiveness, social differentiation and conflicts of interest, poor housing , malnutrition, little purchasing power, low income, low productivity, poor health and poor education.

Significance of the Study

Success of social development programmes depend on relevance of interventions to communities. Development objectives of programmes should be sustainable. Sustainability is ensured by the creation of a sense of ownership of projects by the beneficiaries. Organizations involve community members in choice and implementation of projects to attempt to realize this. Choices at any one time may be influenced by, among other issues, information available, perception of importance of need and an understanding of what is considered the best solution.

Objective

The objective of this study is to assess the judgments into selection of ActionAid Ghana projects by community members in Tamale, Ghana.

Specifically:

1. To determine the various relationships among various variables that are considerations for project establishment.
2. To determine factors that underlie selection of social development projects.

Literature Review

Definition of Poverty

The Ghana Living Standards Survey Four (GLSS 4) defines poverty in absolute terms. The poor are considered as those living in households with per capita expenditure per annum below two thirds of the mean value of the standard of living. The very poor being those with expenditure below half of the mean value of the standard of living. According to UNICEF, a person is said to be in relative poverty if the person receives an income which is below one third of the average per capita income of the country. In northern Ghana, poverty for most people in rural areas is one's inability to feed oneself and dependants all year round. Thus, poverty is seen as food insecurity. However, it is widely recognized that poverty is multi-dimensional, leading not only to physiological deprivation but also to lack of knowledge and participation in civil society (Streeten, 1994). Major characteristics of poverty are the elements of material deprivation and lack of capacity, which ultimately determines the quality of life. Typically these

elements include income sources and employment, patterns of expenditure and the fulfillment of basic needs like education, health and sanitation.

Inadequate access to and control over income generating assets is a major cause of poverty. This is of critical importance because it is these factors which give individuals and households the means to generate income and move out of poverty. The removal of subsidies especially on agricultural inputs and the cost recovery of public services have had an adverse impact on access by the poor to basic services and essential inputs that could boost agricultural production for farmers.

In rural areas where there are substantial opportunities for cash crop production, poor access to capital for farming enterprises impedes individual progress (Sowa, 1992). Studies have also shown that people in the northern savannah lack adequate supply of water for productive and domestic use as well as adequate and fertile farmland. People lack access to seed capital and opportunities for human skill formation.

Illiteracy is a cause and an effect of poverty. People with no literacy skills are denied access to information on income earning opportunities. They may lack practical skills for economic activities, lack confidence and participate less in decision making in the family and community. Illiteracy puts those in disadvantaged groups, such as women, in an even more powerless position and this is particularly the case with regards to lack of information about the constitution and about the law. Illiteracy means that people do not know their legal rights. Injustice worsens the plight of poor and vulnerable groups (The

World Bank, 2001). In the administration of land for agricultural purposes, women, migrants and minority groups are only permitted limited access and control over land. Even in instances where, women have access to these resources, they have to spend much of the farming season working on the farms of their male relatives. This impoverishes them. Certain cultural practices and beliefs promote social injustice and poverty, especially amongst women.

The concentration of social services and infrastructure in urban areas promotes inequity. As a result social amenities like transport, roads, efficient communication links, educational and health facilities are particularly lacking among the rural poor. This limits their access to information and interactions with the political process, resulting in the lack of sufficient capacity to substantially influence political decision making. The interplay between these factors results in social and political marginalization of poor households.

Rural – Urban Poverty Profiles

Some improvements in welfare have been experienced in all the ten regions of Ghana, particularly among farming households. The structure of wealth distribution however remains unchanged. Poverty is still overwhelmingly a rural phenomenon since rural poverty is much higher than the national average. Urban areas in general have suffered less poverty than the national average, though urban poverty is still prevalent. Poverty in rural areas was above the national average of 31.4% and concentrated in the Northern Savannah area. This area accounted for about 22% of national population and 22% of national poverty in 1992 using the higher poverty line (GSS, 2000).

Table 1: Percentage Incidence of Poverty in Ghana by Administrative Region

REGION	1987/1988 INDEX	1988/1989 INDEX	1991/1992 INDEX
Western	17.4	29.1	39.1
Central	50.4	41.7	27.4
Greater Accra	11.1	23.6	22.8
Eastern	34.9	46.9	25.6
Volta	51.8	56	31.1
Ashanti	42.5	41.3	22.1
Brong Ahafo	31.3	27.5	40.5
Northern	47.3	68.7	42.4
Upper East	58.5	55.2	55.8
Upper West	60.5	50.0	32.5
All	36.9	41.8	31.4

Source: GSS Pattern of poverty in Ghana 1988 – 1992

It is worth noting that rural areas recorded larger margins of welfare improvements than the urban areas during the same period causing a narrowing of the gap in living standards between rural and urban areas. This has been made possible through the reduction of urban biased national development resource allocation. Increased activity, over the past twenty years by various governments, in water and sanitation projects, rural electrification, roads and schools construction and rehabilitation accounts for this. These continuing investments are expected to generate such benefits as increased rural based employment and hopefully reduced urban drift from the rural areas. Table 1 gives the incidence of

poverty in Ghana by administrative region in percentages. This assessment is based on a poverty line of £31.5 per year.

Between 1988 and 1992 while poverty increased in the Western Region, it fell consistently in the Central and Upper East regions. By 1992 however, the Upper West, Northern, Brong Ahafo, Western and Upper East had incidences of poverty higher than the national average. The Upper West being the poorest with an incidence of 55.8%.

Gender and Poverty

Women constitute about 51% of the national population. The 2000 population and housing census indicated that rural women constitute 80% of all workers in agriculture, the mainstay of the economy. However the status of women in Ghana is so low. In spite of their social and economic importance, they are among the vulnerable groups in the country with limited choices in life. Women with limited access to family labour such as widows, the aged, childless women and those with young children are less able to produce enough for their needs. In addition cultural biases restrict women's access to land, credit and education thus limiting their capacity to be productive in the market driven economy of present day Ghana. Females head about a third of households in Ghana. This places them in a difficult situation where they are left to fend for their households with little or no support because of break down of social support systems.

Female enrolment at all levels of the educational system falls below that of males and the gender gap widens in favour of males as one moves up the

educational ladder. In 1992, the Ghana Living Standards Survey revealed that, adult literacy rate for females was 38.5% and that of males was 60.8%. Where as in 1997 the percentage of females declined to 36.4%, that of males appreciated to 62.3%. This has telling effects on development as the quality of life and income earning capacity of any given individual is very often influenced by the level of education.

During the lean season, women carry extra labour burdens and disproportionately carry the burdens of food insecurity. They use different coping mechanisms to ensure the daily sustenance of their families. These include a wide variety of income generating activities to provide family income. It is in recognition of all the above that recently there have been many efforts by different actors and stakeholders to promote women's rights, participation and gender equity. NGOs have relentlessly championed the cause of women's empowerment by increasing their networking initiatives and supporting participation of women in all aspects of public and social life.

Food Security and Poverty

A visible indicator of the vulnerability of the poor in Ghana is the perennial food insecurity that prevails in several communities in the rural savannah from March to October each year. This vulnerability is to a large extent due to the fragile physical environment resulting from the depletion of the natural resource base. Hence these communities experience problems of basic food supply even in years of normal rainfall. This situation is further compounded by periodic drought. Agriculture in Ghana is characterized by small scale producers

with farm holdings of 1.2 to 2.0 acres. These farmers produce about 80% of Ghana's food crops. Many practice the bush fallow system. The bush fallow period is getting shorter and shorter and therefore the soil is not able to regenerate enough nutrients to sustain increased production. The slash and burn method of land preparation is very common. This method destroys soil nutrients, thus depleting soil fertility. Inadequate agricultural extension services, poor linkage of farmers with research institutions and their findings and frequent droughts have combined to undermine the mainly rain fed agriculture practised in northern Ghana.

Education and Poverty

The government of Ghana has prioritized education in its policies and has consequently made a massive investment in education. In 1987 the Government embarked on major educational reforms to provide technical and vocational education for local industry and self employment. The provision of basic infrastructure and human resource development of the sector were key areas of focus. More universities are being established and the enabling environment has led to local participation in tertiary education especially by churches. Spending in Education has increased to almost 40% of the national recurrent budget, with about 90% of this allocated to basic education; the first nine years in school. The free Compulsory Universal Basic Education (fCUBE) Policy, together with its spending allocation, is designed to reduce the inequality in education between the rich and the poor. By this policy, communities would be part of the management of schools in order to ensure effective supervision. However the positive effects

of this policy are yet to be realized by majority of the people especially in the rural areas and the education crisis in access and quality continues. The poorest 20% of the population appear to have gained least from the educational reforms. This inability to take full advantage of the reforms has been blamed on increased cost in transport, food, furniture, uniforms and extra charges. Many parents prefer to keep boys and girls at home to work on the farm and engage in income generating activities respectively. In addition girls are required to take care of their younger siblings while their mothers work. It is not surprising the gap in educational attainment between males and females persists.

There are also indications that secondary and tertiary institutions are moving towards privatization and are therefore less accessible to the poorest groups. Most pre schools are private and are therefore an option for parents who can afford to give their children a good start academically. National tests (Criterion Ranking) in 1998 showed that only 3.6% of the pupils who left primary school could use basic English, and only 1.8% could understand basic mathematics. There is an adult literacy rate of only 48.8% (GSS 1995).

Human Development and Increased Welfare

Social development seeks to improve the living conditions and the welfare of all citizens of a society (Martinussen, 1997). In most literature the focus has been on income measurements of one kind or another with growth in real incomes being the main target. Some have however argued that increased incomes should be regarded as a means to improve human welfare and not as an end in itself (Sen, 1988; Streeten, 1981). This is illustrated by comparing per capita incomes with

indicators of education or health standards. Figures from the mid 1980s show that establishing a relationship between income figures and average life expectancy in many countries was difficult. With an average income of US$1700, Brazil had an average life expectancy of only 64 years whereas Sri Lanka, with average income of US$360 had life expectancy of 70 years (Sen, 1988).

In its first Human Development Report, the United Nations Development Programme presented a more comprehensive concept of human development (United Nations Development Programme [UNDP], 1990). It defines human development as a process of enlarging people's choices. At first, three areas were considered: the opportunity to lead a long and healthy life, the opportunity to acquire knowledge, and the opportunity to have access to resources needed for a decent standard of living. In subsequent reports the UNDP added considerations regarding political freedom and human rights; human development for women as well as for men; environmental and other aspects of sustainability; and themes regarding citizens' participation and opportunities to affect political decisions in society (Martinussen, 1997).

Major Institutions in Development

The Government of Ghana has primary responsibility for development. Other actors and stakeholders include bilateral and multilateral agencies, NGOs, foundations, thrusts, corporations and religious bodies.

Government of Ghana

The Government of Ghana has designed a national development policy framework, Vision 2020, to guide development initiatives in the country. Since

1983, Government's approach to national development has followed the tighter economic and social policies of the World Bank and the International Monetary Fund. Considerable progress has been made in the national economy with a growth rate estimated at about 4.5% per annum. Governments continue to make efforts to put in place conditions favorable for both domestic and external inflow of investment to support the continuing development drive to move the country to a middle income one by the year 2020 (NDPC, 1995).

Vision 2020 is the significant improvement in the quality of life of all Ghanaians demonstrated by the attainment of:

- Basic human rights and freedoms for all.
- Equitable distribution of the benefits of development, balanced regional development and elimination of gross deprivation and hard core poverty.
- Universal access to work, shelter and leisure with adequate remuneration and affordable shelter for all.
- Adequate and affordable water supply and health care system for all citizens.
- Universal basic education with improved access to secondary and tertiary education.
- Provision of appropriate measures for safeguarding national security.
- Economic growth (or an increase in national income) of about 8% per annum on average, proper management of population and its growth to ensure continuous annual increase in real income per person.

The National Development Planning Commission coordinates the micro plans from the regions and districts. Each District Assembly sets aside 50% of the common fund to be utilized for the provision of basic services and 20% to create employment opportunities through supporting small scale enterprises for the poor (Poverty Alleviation Fund). 10% of the common fund is also given to members of Parliament for poverty alleviation activities in their constituencies. Under programmes like the Agricultural Sector Investment Project (ASIP) and the Village Infrastructure Project (VIP), infrastructure has been provided over the years for the rural economy. Dams and markets have been built to promote small scale all year round food production. Feeder roads have also been constructed to ease transportation of food from the hinterland to market centres for better prices.

Private Sector

The private sector is the second largest formal employer after the public sector. It employs close to half of all salaried workers and contributes more than half of the national gross domestic product.

Bilateral and Multilateral Agencies

Bilateral and multilateral agencies have made significant contributions to Ghana's economic performance especially at the macro level. Some of these agencies are briefly described in what follows.

The International Monetary Fund and the World Bank

The International Monetary Fund (IMF) and the World Bank (WB) have assisted Ghana with grants and loans for programmes like the economic recovery programme. The IMF has also secured and sustained donor support for Ghana's

efforts to become a middle-income country in the 21st century. The areas of involvement of the WB include environmental promotion activities, improved livestock production, electrification, functional literacy, improving urban transport, enterprise development, village infrastructure development and rural water, among others. It also has a component which aims at building the capacity of government institutions to be able to sustain these programmes. However the conditionalities associated with these loans and grants have adversely affected the poor e.g. reduced social service provision by Government, removal of agricultural subsidies and cost sharing in tertiary education.

United Nations

The United Nations has a number of specialized agencies in the country that complement Government's efforts at development. These include UNDP, UNICEF, WFP, UNHCR, FAO, UNESCO, ILO, UNCTAD and UNFPA. They provide technical support and funds for development activities. This is done through relevant Government ministries and NGOs.

In recent years, the UNDP has provided support for capacity building, poverty alleviation and private sector entrepreneurial development initiatives. UNICEF provides support to reduce infant and maternal mortality rates in the country. Other areas include basic education for children, literacy for women, local capacity building for social development, primary health care, reproductive health, HIV/AIDS and child survival activities.

The World Food Programme (WFP) runs two main interventions; supplementary feeding, health and nutrition education for mothers and children

aged six months to five years and the support to basic education programme involving food rations and cooked meals for pupils in school. WFP has also responded to emergencies like the floods that occurred in northern Ghana in August 2007. UNHCR has supported refugees from Liberia and Togo with food and non food relief items. The FAO has supported several researches in agriculture in Ghana aimed at finding the best way of achieving food security for the nation especially in the three northern regions. It also funds irrigation projects in northern Ghana.

European Union

The support of the European Union (EU) to the Ghanaian economy dates back to the late 1970s. Recent involvement has been in the area of micro projects in education. It has also been involved in the capacity building process of Government institutions in the country.

Department for International Development

According to Department for International Development (DFID) country strategy paper, its partnership with the Government of Ghana is aimed at reducing poverty. The overall objective of the partnership is to support Ghana's development efforts as set out in vision 2020. DFID supports Government of Ghana sector policies which aim at providing better services for all Ghanaians. The support is in health, education, water and sanitation.

Other Agencies

German Technical Coorporation Agency (GTZ) has over the years supported structural adjustment, agriculture and rural development, forestry,

infrastructure and institutional capacity building in Ghana. The Canadian International Development Agency (CIDA) supports water and sanitation projects, women's activities and intermediate technology projects. The United States Agency for International Development (USAID) has been very active in the area of reproductive health, HIV/AIDS, primary education and support for strengthening of democratic institutions in the country. It also supports private sector led export investment and relief interventions during emergencies. DANIDA is a Danish development agency that has supported health, functional literacy and water and sanitation activities in the country. It has assisted in the development of health infrastructure, human resource and institutional capacity building for district assemblies and local NGOs.

Foundations and Trusts

Foundations such as Konrad Adenauer, Friedrich Ebert, Wallace Global and Ford and Global Fund for Women have sponsored local institutions to carry out training and education in the areas of leadership development, capacity building, research, advocacy and good governance. VALCO Trust, a local trust fund has also played a major role in education. Their contributions have had significant impact on the economy of Ghana.

Non-Governmental Organizations

Non-Governmental Organizations (NGOs) include all Civil Society Organizations (CSOs), that is, all groups of individuals that fall outside the public and private for profit sectors. There are over 500 registered NGOs in Ghana. The work of NGOs includes training, technical support, research, assistance in

formulating projects, exchange of information and experiences as well as civic education and advocacy. NGOs focus on implementing programmes in thematic areas like education and food security, among others. They usually develop a strategy paper that guides their operations over a number of years. Such a strategy would usually be informed by the problems identified and stake holders. They strengthen communities and institutions to promote and support development. In Ghana a wide variety of NGOs exist by size, expertise, experience, geographical scope, sector of work and access to resources. Three categories of NGOs have been identified; international, national and local.

International NGOs normally have headquarters in developed countries. They can access high expertise and a wealth of rich experience from their international linkages. They have access to a good amount of resources. They are both secular and religious and usually have a specific thematic focus. Examples are World Vision International (WVI), Catholic Relief Services (CRS), CARE International, PLAN International, Technoserve, OXFAM GB and ActionAid.

National NGOs operate within a wide geographical area in Ghana. Their leadership often has high expertise and a wealth of experience in development issues. Examples are the Centre for the Development of People (CEDEP), Integrated Social Development Centre (ISODEC) and the African Centre for Human Development (ACHD).

Local NGOs serve a specific population group in a small geographical area with special interests. They often do not have high expertise but rather possess commitment to improving the lot of the poor. Community based

Organisations have similar characteristics to Local NGOs but are more locally based as for example within a particular community or group of few communities. They play important roles in the development of their communities. They help explain development issues, mobilize community members and actively participate in the implementation and monitoring of development projects.

ActionAid Ghana

ActionAid Ghana (AAG) is part of an international anti poverty agency working in over forty countries in Africa, Asia and Latin America, taking sides with the poor to end poverty and injustice together. The Organisation began working in Ghana in the Bawku area in the Upper East Region in 1990. In 1997, another programme started in the Tamale area of the Northern Administrative Region. In these two locations the Organisation intervened in communities using an integrated development approach. The Organisation did not restrict itself to any specific thematic area of work from 1991 to 1999. The development interventions it carried out were mainly in response to expressed community needs. The interventions were in the areas of education, health, gender, peace building, water, sanitation, agriculture and food security, savings and credit and institutional capacity building.

AAG's mission is to work with poor and excluded people to eradicate poverty by overcoming the injustice and inequality that cause it.

AAG's vision is a world without poverty and injustice in which every person enjoys their right to life with dignity.

After ten years of working in Ghana, the work of ActionAid was reviewed in order to learn from its experiences, reinforce its strengths and prepare to face new challenges in development. This was the review of ActionAid Ghana (AAG) Country Strategy Paper (CSP) I, 1996 – 1999. The review led to a new way of working with communities and other stakeholders. Through the Organisation's experiences it became convinced that the cause of poverty in developing countries may be attributed to the denial of the basic rights of people. This provided the Organisation with a new impetus to advocate and campaign for reformation and creation of systems and structures that will empower the poor. The platform was therefore created for addressing not just the symptoms and manifestations of poverty but also the root causes of poverty.

During the period 1991 to 1999, Key achievements of AAG were:

- Innovative alternative approaches to increasing access to education.
- Leadership in conflict resolution and peace building related initiatives.
- Hands on approach to increasing food security.
- Strong track record in intervening in poverty in Northern Ghana.
- Sustained micro finance delivery; savings and credit and innovative approaches to resourcing the vulnerable.

Country Strategy Paper II was implemented from 2000 to 2004. During the period, the focus was on Education, Food Security and Capacity Building programmes for communities, local NGOs and agencies of the local government system. Specific issues attended to were; access to quality basic education and access to productive natural resources for communities.

Country Strategy Paper III covered the years 2005 to 2009. Whilst the CSP II was a mix of delivery of services and rights work, the CSP III focused more on using human rights as a framework for action (rights based approach), working in partnerships, alliances and movements with others, addressing the root causes of poverty, advocating for change by organizing people to speak for themselves and finally using gender analysis to ensure men and women benefit equitably from all the Organization's programmes.

Data Collection

The data is primary and is collected from 100 respondents in 20 communities in the Tamale Metropolitan Assembly area where ActionAid Ghana works.

Community discussions, in all 20 communities, were done using participatory rural appraisal techniques, to gather a group of selection criteria in terms of beneficiary expectation of projects in Education Rights, Gender and Women's Rights and Food Rights. This yielded 6 criteria for education, 6 for gender and women's rights and 4 for food rights.

Table 2: Selection Criteria

Variable	Variable Name
X_1	Comfort Learning
X_2	Increase Interest
X_3	Good Teachers
X_4	Improve Teaching
X_5	Raise Literacy
X_6	Enlightenment
X_7	Less Violence
X_8	Earn Income
X_9	Family Budget
X_{10}	Gain Respect
X_{11}	Decision Making
X_{12}	Assembly Representation
X_{13}	Food Available
X_{14}	Increase Income
X_{15}	Pay Bills
X_{16}	Living Standard

This was developed into a questionnaire and administered to 100 respondents selected by purposive sampling. The 100 respondents are 20 persons each from five groups that are representative of the population; community chairman (men), magazia (women), male youth leader, female youth leader and school pupil. One person in each category is administered a questionnaire in each community, giving five respondents in each of the 20 communities.

Coding

The selection criteria are treated as binary variables, taking values of '0' for 'non selection' and '1' for 'selection'. Microsoft Excel and SPSS are used for statistical analysis of the coded data.

Outline of Dissertation

Chapter one discusses the background of the study, the objective of the study, literature review, data collection and an outline of the work. Chapter Two discusses a review of basic theory and methods, including human development indicators and factor analysis. Chapter Three, devoted to the preliminary analysis, explores the data using charts, describes the nature of the responses and examines correlations among the variables. Chapter Four proceeds to do a further analysis following the preliminary analysis. A summary, discussion and conclusion are presented in Chapter Five. The final section contains references that have aided this work and concludes with the appendices.

CHAPTER TWO

REVIEW OF BASIC THEORY AND METHODS

This is a review of basic theories and methods that give indications of level of development and the method used in analyzing this data.

Human Development Indicators

There are a number of key indicators of human development. These are the Human Development Index (HDI), the Gender-related Development Index (GDI), the Gender Empowerment Measure (GEM) and the Human Poverty Index (HPI). The trends emanating from these indicators, for Ghana, are summarized in table 3 below.

The Human Development Index (HDI) measures the average achievements in a country in three basic dimensions of human development: a long and healthy life, knowledge and a decent standard of living. These dimensions are derived from three basic indicators, namely, life expectancy, adult literacy rate and GDP per capita in purchasing power parity (PPP). A country with an index between 0.5 and 0.7 inclusive is said to belong to a "medium human development" group. Countries with index above 0.7 are referred to as "high human development" countries. A country with an index of less than 0.5 is said to belong to a "low human development" group.

Table 3: Human Development and Related Indicators from 1991 to 2006

Year	HDI	GDI	GEM	HPI
1991	0.501	0.473	0.371	0.380
1992	0.482	0.473	0.371	0.380
1993	0.467	0.485	0.374	0.374
1994	0.468	0.497	0.378	0.367
1995	0.531	0.509	0.381	0.361
1996	0.538	0.521	0.384	0.354
1997	0.540	0.533	0.388	0.348
1998	0.553	0.545	0.391	0.342
1999	0.542	0.545	0.391	0.342
2000	0.555	0.543	0.388	0.341
2001	0.567	0.542	0.385	0.339
2002	0.568	0.540	0.383	0.338
2003	0.520	0.550	0.380	0.337
2004	0.532	0.560	0.377	0.336
2005	0.536	0.596	0.374	0.335
2006	0.540	0.596	0.374	0.373

Source: UNDP Ghana Human Development Report 2007

Data available (Table 3) indicates that since 1995, there has been a steady improvement in human development in Ghana. The HDI for Ghana rose from 0.531 in 1995 to 0.568 in 2002 and reduced slightly to 0.540 in 2006. Since 1995 Ghana has maintained its position among a group of countries classified as "medium human development" in terms of the three basic dimensions of

development. Data available further indicates that since 1995, Ghana has experienced a marked improvement in life expectancy at birth. Life expectancy at birth rose from 57.45 years in 1991/1992 to 58.50 years in 2005/2006. Ghana's adult literacy rate rose from 0.488 in 1991/1992 to 0.500 by 1998/1999, though it declined by 20005/2006. The country's economic performance indicated by GDP measured in purchasing power parity terms showed modest growth with the GDP index rising from 0.501 in 1995 to 0.540 in 2005/2006 (UNDP, 2007).

The HDI is given by:

$$\text{HDI} = \frac{1}{3}(\text{Life Expectancy Index}) + \frac{1}{3}(\text{Education Index}) + \frac{1}{3}(\text{GDP Index}) \qquad (1)$$

where Educational Index is given by:

$$\text{Educational Index} = \frac{2}{3}(\text{Adult Literacy Index}) + \frac{1}{3}(\text{Gross Enrolment Index}) \qquad (2)$$

Each of the above indices is calculated as follows:

$$\text{Dimension Index} = \frac{\text{Actual Value} - \text{Minimum Value}}{\text{Maximum Value} - \text{Minimum Value}} \qquad (3)$$

In the calculation of GDP, income is adjusted because the achievement of a respectable level of human development does not depend on having unlimited income. Accordingly, the logarithm of income is used.

The Human Poverty Index (HPI) is a summary measure of deprivation in three basic dimensions of human development: a long and healthy life as measured by probability of not surviving to age 40, knowledge as measured by adult literacy and a decent standard of living as measured by two indicators i.e. the percentage of population without sustainable access to an improved water source and the percentage of children underweight. The index has a direct

relationship to the incidence of deprivation; the lower the index, the fewer the number of people deprived. Available data points to the fact that, for 2006, Ghana scored 37.3% which signifies that one out of every three Ghanaians was deprived in terms of a healthy life, knowledge and a decent standard of living. These worsened from 34.2% in 1998 (UNDP, 2007).

The Gender-related Development Index (GDI) is a composite index measuring average achievement in the three basic dimensions of human development reflected in the HDI adjusted to account for inequalities between males and females in the country. These are adult literacy, gross enrolment rate and estimated earned income. The higher the index, the larger the proportion of the gender dimensions of development in these three basic areas of development. As the index gets close to one, it narrows the gap between males and females with regard to gender. When close to zero, there is a wide gap between males and females on gender dimensions of human development. Data available indicates that the GDI increased from 0.473 in 1991/1992 to 0.596 in 2005/2006 which means that, over the period, a progressive number of women experienced improvement in terms of the three basic dimensions of human development. For every 100 males that have enjoyed development, 60 females experience the same level of development (UNDP, 2007). There is still a lot of work to be done to narrow this gap between males and females and to ensure that improvement can be translated into practical, active and meaningful participation of women at all levels.

The Gender Empowerment Measure (GEM) is a composite index measuring gender inequality in the fundamental dimensions of empowerment and participation: political participation, decision making and power over economic resources. The higher the value of the GEM index, the larger the proportion of females who are being empowered compared to males who are empowered. As the index gets close to one, it narrows the gap between males and females in gender issues on empowerment. Close to zero indicates a wider gap between males and females in gender issues on empowerment. Data available indicates that in 1991/1992 the GEM for Ghana was 0.391. In 2005/2006, the GEM was 0.374. For every 100 males, 37 females are at the same level of empowerment. Some socio cultural challenges in the form of social practices, systems and structures which impede the development of females could account for this situation (UNDP, 2007).

Other Indicators of Development

Human Development and Poverty

There is a relationship between human development and poverty. The relationship is drawn from the equation:

$$PovR = 0.63726 - 0.2755HDI \quad (4)$$

An attempt to measure this relationship for Ghana indicates that a one percent increase in Human Development Index (HDI) is associated with a 0.27 percent reduction in poverty. There is a negative relationship between the two (UNDP, 2007).

The Physical Quality of Life Index (PQLI)

The PQLI measures how well societies satisfy certain specific 'life-serving social characteristics' or 'achieved-well being' (Dossel & Gounder, 1994). Therefore its focus is on social development. The PQLI is based on three indicators: infant mortality, life expectancy and basic literacy. PQL is given by:

$$PQL = f(IM, e, lit) \tag{5}$$

$$\text{Where}: IM = \text{infant mortality}, e = \text{life expectancy}, lit = \text{literacy}$$

The indices for these three indicators are summed up and the average gives PQLI. This is given by:

$$PQLI = \frac{(IMI + eI + litI)}{3} \tag{6}$$

$$\text{Where}: IMI = \text{infant mortality}, eI = \text{life expectancy index}, litI = \text{literacy index}$$

Inequality Measures

Inequality measure is a broad concept that is defined over the whole population. Most inequality measures do not depend on the mean of the distribution and this property of mean independence is considered to be a desirable property of an inequality measure. The most widely used single measure of inequality is the Gini coefficient of inequality. The Gini coefficient is based on the Lorenz curve; a cumulative frequency curve that compares the distribution of a specific variable with a uniform distribution that represents equality. To construct the Gini coefficient, the cumulative percentage of households, from poor to rich, is graphed on the horizontal axis and the cumulative percentage of expenditure or income, on the vertical axis. This will give a Lorenz Curve if a graph of perfect equality is also drawn on the same axes. The Gini's coefficient

will be defined as the ratio of the area between the two curves to the area between the equality curve and the -axis. The closer to 1 the coefficient is, the more unequal the distribution. The index is given as:

$$G = 1 - \sum_{i=0}^{N} (\sigma\sigma_{i-1} + \sigma Y_i)(\sigma(_{i-1} - \sigma X_i) \quad (7)$$

Where and are cumulative percentages of *Xs* and *Ys* (in fractions) and *N* is the number of elements (observations).

Factor Analysis

Factor analysis is a statistical method used to describe correlation among observed variables in terms of fewer unobserved variables called factors. The observed variables are modeled as linear combinations of the factors, plus error terms. The information gained about the interdependencies may be used to reduce the set of variables in a dataset. Factor analysis originated in psychometrics, and is used in behavioral sciences, social sciences, marketing, product management, operations research, and other applied sciences (Harman, 1976; Kline, 1994).

Data Reduction

Factor Analysis is primarily used for data reduction or structure detection. The purpose of data reduction is to remove redundant (highly correlated) variables from the data, replacing the entire data with a smaller number of uncorrelated variables. The purpose of structure detection is to examine the underlying or latent relationships between the variables. The Factor Analysis procedure has several extraction methods for constructing a solution.

The principal components method of extraction begins by finding a linear combination of variables that accounts for as much variation in the original

variables as possible. It then finds another component that accounts for as much of the remaining variation as possible and is uncorrelated with the previous component, continuing in this way until there are as many components as original variables. Usually, a few components will account for most of the variation, and these components can be used to replace the original variables. This method is used to reduce the number of variables.

Other Factor Analysis extraction methods go one step further by adding the assumption that some of the variability in the data cannot be explained by the components (usually called factors in other extraction methods). As a result, the total variance explained by the solution is smaller; however, the addition of this structure to the factor model makes these methods ideal for examining relationships between the variables (Gorsuch, 1983).

With any extraction method, the two main issues of concern that a good solution should try to answer are, how many components (factors) are needed to represent the variables and what these components represent.

Principal Component Analysis

Principal Component Analysis (PCA) involves a mathematical procedure that transforms a number of possibly correlated variables into a smaller number of uncorrelated variables called principal components. The first principal component accounts for as much of the variability in the data as possible, and each succeeding component accounts for as much of the remaining variability as possible. Depending on the field of application, it is also named the discrete

Karhunen–Loève Transform (KLT), the Hotelling Transform or Proper Orthogonal Decomposition (POD).

PCA was invented in 1901 by Karl Pearson. Now, it is mostly used as a tool in data analysis and for making predictive models. PCA involves the calculation of the eigenvalue decomposition of a data covariance matrix or singular value decomposition of a data matrix, usually after mean centering the data for each attribute. The results of a PCA are usually discussed in terms of component scores and loadings (Shaw, 2003).

PCA is the simplest of eigenvector-based multivariate analyses. Often, its operation can be thought of as revealing the internal structure of the data in a way which best explains the variance in the data. If a multivariate dataset is visualized as a set of coordinates in a high-dimensional data space (1 *axis* per variable), PCA supplies a lower-dimensional picture, a 'shadow' of this object when viewed from its, in some sense, most informative viewpoint (Johnson & Wichern, 1992).

PCA is mathematically defined as an orthogonal linear transformation that transforms the data to a new coordinate system such that the greatest variance by any projection of the data comes to lie on the first coordinate, called the first principal component, the second greatest variance on the second coordinate, and so on. PCA is theoretically the optimum transform for given data in least square terms (Anderson, 1984).

For a data matrix, XT, with zero empirical mean i.e. the empirical mean of the distribution haven been subtracted from the data set, where each row

represents a different repetition of the experiment, and each column gives the results from a particular probe, the PCA transformation is given by:

$$Y^T = X^T W = V \sum \quad (8)$$

where $V \sum WT$ is the singular value decomposition (svd) of XT.

Given a set of points in Euclidean space, the first principal component i.e. the eigenvector with the largest eigenvalue, corresponds to a line that passes through the mean and minimizes the sum of squared error with those points. The second principal component corresponds to the same concept after all correlation with the first principal component has been subtracted out from the points. Each eigenvalue indicates the portion of the variance that is correlated with each eigenvector. Thus, the sum of all the eigenvalues is equal to the sum of squared distance of the points from their mean divided by the number of dimensions. PCA essentially rotates the set of points around their mean in order to align with the first few principal components. This moves as much of the variance as possible, using a linear transformation, into the first few dimensions. The values in the remaining dimensions, therefore, tend to be highly correlated and may be dropped with minimal loss of information. PCA is often used in this manner for dimensionality reduction. PCA has the distinction of being the optimal linear transformation for keeping the subspace that has largest variance (Sharma, 1996).

Discussion

Though most derivations and implementations fail to identify the importance of mean subtraction, data centering is carried out because it is part of the solution towards finding a basis that minimizes the mean square error of

approximating the data. Assuming zero empirical mean; the empirical mean of the distribution haven been subtracted from the data set, the principal component W_1 of a data set x can be defined as:

$$W_1 = \arg\max_{\|w\|=1} \operatorname{var}\{W^T X\} = \arg\max_{\|w\|=1} E\{(W^T X)^2\} \tag{9}$$

With the first $k-1$ components, the component can be found by subtracting the first $k-1$ principal components from x:

$$\overline{X}_{k-1} = X - \sum_{i=1}^{k-1} W_i W_i^T X \tag{10}$$

and by substituting this as the new data set to find a principal component in

$$W_k = \arg\max_{\|w=1\|} E\{(W^T \overline{X}_{k-1})^2\} \tag{11}$$

The Karhunen–Loève Transform is therefore equivalent to finding the singular value decomposition of the data matrix X,

$$X = W \sum V^T \tag{12}$$

and then obtaining the reduced-space data matrix Y by projecting X down into the reduced space defined by only the first L singular vectors, WL:

$$Y = W_L^T X = \sum_L V_L^T \tag{13}$$

The matrix W of singular vectors of X is equivalently the matrix of eigenvectors of the matrix of observed covariances $C = X XT$,

$$XX^T = W \sum \sum^T W^T x x^T \tag{14}$$

The eigenvectors with the largest eigenvalues correspond to the dimensions that have the strongest correlation in the data set.

Computing PCA

A detailed description of PCA using the covariance method is attempted here. The goal is to transform a given data set X of dimension M to an alternative data set Y of smaller dimension L. Equivalently, we are seeking to find the matrix Y, where Y is the Karhunen–Loeve Transform (KLT) of matrix X:

$$Y = \mathrm{KLT}\{X\} \tag{15}$$

We begin by organizing the data set. Suppose we have a data comprising a set of observations on M variables, and want to reduce the data so that each observation can be described with only L variables, $L \prec M$, Suppose further, that the data are arranged as a set of N data vectors $X_1 \ldots X_N$ with each X_n representing a single grouped observation of the M variables.

We write $X_1 \ldots X_N$ as column vectors, each of which has M rows, place the column vectors into a single matrix X of dimensions MXN and calculate the empirical mean.

The empirical mean along each dimension $m = 1,\ldots,M$ is found and the calculated mean values are placed into an empirical mean vector u of dimensions $MX1$.

$$u[m] = \frac{1}{N}\sum_{n=1}^{N} X[m,n] \tag{16}$$

Mean subtraction is an integral part of the solution towards finding a principal component basis that minimizes the mean square error of approximating the data (Kim & Mueller, 1978b). Hence we proceed by centering the data as

follows: Subtract the empirical mean vector u from each column of the data matrix X and store mean-subtracted data in the MXN matrix B.

$$B = X - uh \tag{17}$$

where h is a $1XN$ row vector of all 1's:

$$h[n] = 1 \qquad \text{for } n = 1...N \tag{18}$$

We proceed to find the covariance matrix. We find the MXM empirical covariance matrix C from the outer product of matrix B with itself:

$$C = E[B \otimes B] = E[B \bullet B^*] = \frac{1}{N}\sum B \bullet B^* \tag{19}$$

where E is the expected value operator, $\otimes$ is the outer product operator, and $*$ is the conjugate transpose operator.

If B consists entirely of real numbers, which is the case in many applications, the conjugate transpose is the same as the regular transpose.

Find the eigenvectors and eigenvalues of the covariance matrix.

Compute the matrix V of eigenvectors which diagonalizes the covariance matrix C:

$$V^{-1}CV = D \tag{20}$$

where D is the diagonal matrix of eigenvalues of C. This step will typically involve the use of a computer-based algorithm for computing eigenvectors and eigenvalues. These algorithms are readily available as sub-components of most matrix algebra systems, such as MATLAB, Mathematica, SciPy, Interactive Data Language (IDL) and GNU Octave (Kim & Mueller, 1978a).

Matrix D will take the form of an MXM diagonal matrix, where

$$D[p,q] = \lambda_m \qquad \text{for } p = q = m \tag{21}$$

is the eigenvalue of the covariance matrix C, and

$$D[p,q] = 0 \qquad \text{for} \quad p \neq q \tag{22}$$

Matrix V, also of dimension MXM, contains M column vectors, each of length M, which represent the M eigenvectors of the covariance matrix C. The eigenvalues and eigenvectors are ordered and paired. The mth eigenvalue corresponds to the eigenvector (Chartfield & Collins, 1980). The eigenvectors and eigenvalues are then rearranged. We sort the columns of the eigenvector matrix V and eigenvalue matrix D in order of decreasing eigenvalue making sure to maintain the correct pairings between the columns in each matrix. The cumulative energy content for each eigenvector is computed. The eigenvalues represent the distribution of the source data's energy among each of the eigenvectors, where the eigenvectors form a basis for the data. The cumulative energy content g for the mth eigenvector is the sum of the energy content across all of the eigenvalues from 1 through m:

$$g[m] = \sum_{q=1}^{m} D[q,q] \quad \text{for } p = q \text{ and } m = 1,\ldots,M \tag{23}$$

Select a subset of the eigenvectors as basis vectors and save the first L columns of V as the MXL matrix W:

$$W[p,q] = V[p,q] \qquad \text{for } p = 1,\ldots,M \qquad q = 1,\ldots,L \tag{24}$$

where $1 \leq L \leq M$.

The vector g is used as a guide in choosing an appropriate value for L. The goal is to choose as small a value of L as possible, while achieving a

reasonably high value of g on a percentage basis. For example, we may want to choose L so that the cumulative energy g is above a certain threshold, like .

In this case, the smallest value of L is chosen such that,

$$g[m = L] \geq 90\% \tag{25}$$

Convert the source data to z-scores.

Create an $MX1$ empirical standard deviation vector s from the square root of each element along the main diagonal of the covariance matrix C:

$$S = s[n] = \sqrt{C[p,q]} \quad \text{for } p = q = m = 1 \ldots M \tag{26}$$

Calculate the $MXN z-\text{score}$ matrix:

$$Z = \frac{B}{s.h} \tag{27}$$

While this step is useful for various applications as it normalizes the data set with respect to its variance, it is not an integral part of PCA/KLT.

Project the data onto the new basis.

The projected vectors are the columns of the matrix,

$$Y = W^* \bullet Z = KLT[K] \tag{28}$$

The columns of matrix Y represent the Karhunen–Loeve Transforms (KLT) of the data vectors in the columns of matrix X.

Derivation of PCA Using the Covariance Method

Let X be a d- dimensional random vector expressed as a column vector. Without loss of generality, we assume X has zero mean. We want to find a dXd orthonormal transformation matrix P such that

$$Y = P^T X \tag{29}$$

with the constraint that $COV(Y)$ is a diagonal matrix and $P^{-1} = P^T$.

By substitution, and matrix algebra, we obtain:

$$\begin{aligned} COV(Y) &= E[YY^T] \\ &= E[(P^T X)(P^T X)^T] \\ &= E[(P^T X)(X^T P)] \\ &= P^T COV(X) P \end{aligned} \tag{30}$$

We now have:

$$\begin{aligned} PCOV(Y) &= PP^T COV(X)P \\ &= COV(X)P \end{aligned} \tag{31}$$

We rewrite P as d x1 column vectors, so $P = [P_1, P_2, \ldots, P_d]^T$

and $COV(Y)$ as:

$$COV(Y) = \begin{bmatrix} \lambda_1 & \cdots & 0 \\ \vdots & \ddots & \vdots \\ 0 & \cdots & \lambda_d \end{bmatrix} \tag{32}$$

Substituting into (32), we obtain:

$$[\lambda_1 P_1, \lambda_2 P_2, \ldots, \lambda_d P_d] = [cov(X)P_1, cov(X)P_2, \ldots, cov(X)P_d] \tag{33}$$

Notice that in $\lambda_i P_i = cov(X)P_i$, P_i is an eigenvector of the covariance matrix of X. Therefore, by finding the eigenvectors of the covariance matrix of X, we find a projection matrix P that satisfies the original constraints.

CHAPTER THREE

PRELIMINARY ANALYSIS

This chapter explores the data by using charts, describing the nature of the responses and examining correlations among the variables.

Exploratory Analysis

It is useful to examine the frequency distributions of the relevant variables, namely, the criteria for selecting projects.

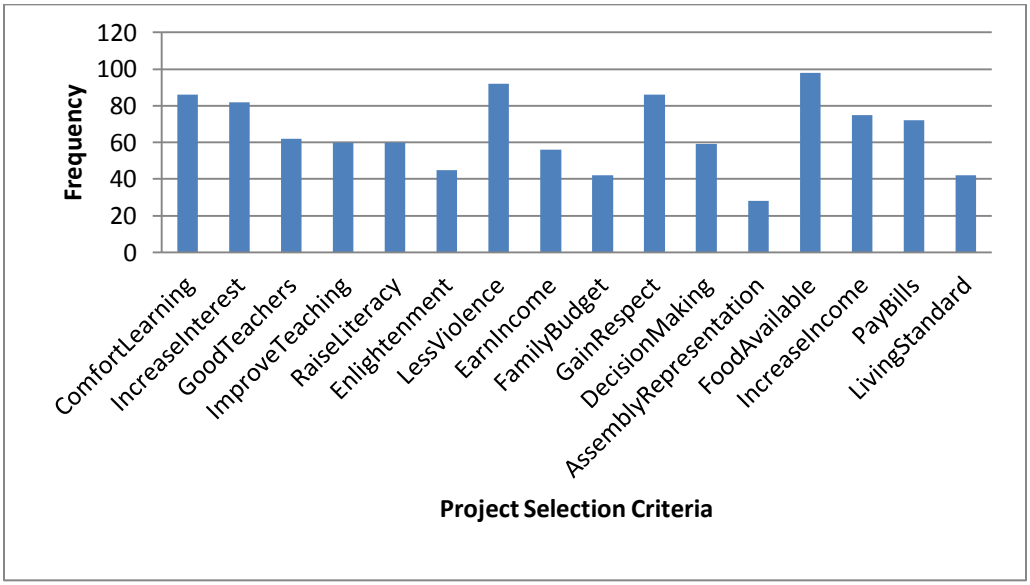

Figure 1: Distribution of Project Selection Criteria

In Figure 1 there is a gradual decrease from 86% choosing 'comfortable learning environment' to 45% selecting 'enlightenment'. These first six issues along the criteria axis fall under education. People are of the view education projects will give them comfortable learning environments most whilst their least consideration is enlightenment and development. They give equal importance to

improved teaching in their community schools and increase in literacy levels in the community. This may be because they are able to relate improved teaching to numeracy and literacy and therefore expect an improvement in literacy levels in their community. Whereas literacy has 60%, enlightenment scored a mere 45%. People may not readily be able to relate literacy with enlightenment.

The sample community members expect that, if the Organization works with them in the area of women's rights, the greatest benefit will be a reduction in violence against women and children. This was selected 92 out of a 100 instances. Also for women's rights, community members think women's representation at the assembly is of little importance to them. This selection criterion received mention only 28 out of 100 times. The results also show that a high proportion, 86% of respondents expect a benefit of women's rights work to be that women will gain the respect of their husbands.

In the case of food crop production and animal rearing programme, a high percentage of respondents, 98%, think that such a programme will readily make food available, followed by expectations of an increase in income as this received mention 75 out of 100 times. Then in third place of the four criteria here, is the issue of ability to pay school fees and medical bills. This received mention 72 out of 100 times. Less than half of the respondents, 42%, expect that there will be a general improvement in the standard of living.

Of the sixteen criteria for the selection of projects, an expected increase in availability of food received the highest mention 98 times and Assembly representation of women, received the least mention of 28. The distribution shows

that people may be more readily able to identify immediate needs than issues of rights.

Education Rights

Figure 2 gives a pictorial representation of how each of six selection criteria under education is considered as a possible benefit by the five different groups of people representing the population.

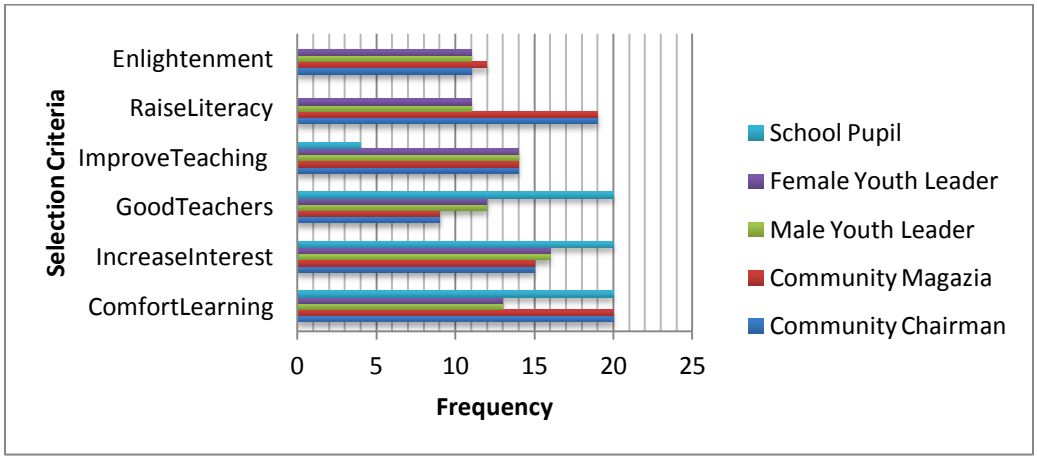

Figure 2: Distribution of Education Criteria Selection

All 20 community chairmen, 20 magazias (community women's leaders) and 20 school pupils in the sample, 100% each, consider a comfortable learning environment as an important result. However, only thirteen (65%) of male and female youth each, consider this criteria as important. For the criteria 'increased interest in schooling', 75% each of chairmen and magazias selected it. This increased to 80% of male and female youth leaders whilst all twenty (100%) school pupils thought there would be increased interest in schooling by children and parents. Nine (45%) of chairmen and nine (45%) of magazias think that good classroom accommodation will attract good teachers to the community. Twelve (60%) each of male and female youth leaders think this way and all twenty

(100%) school pupils expect good teachers to come to their community when school buildings are good. Four (20%) school pupils think that there will be an improvement in teaching and learning and fourteen (70%) persons each, of the other four groups think this way. In the case of raising literacy as an expected result, no school pupil (0%), selected this option, eleven (55%) of male and female youth leaders think this is possible and nineteen (95%) of magazias and chairmen agree. No school pupil thinks enlightenment and development will improve, eleven (55%) Chairman, male and female leaders each, think it will, and finally, twelve (60%) magazias expect an improvement in enlightenment and development.

Women's Rights

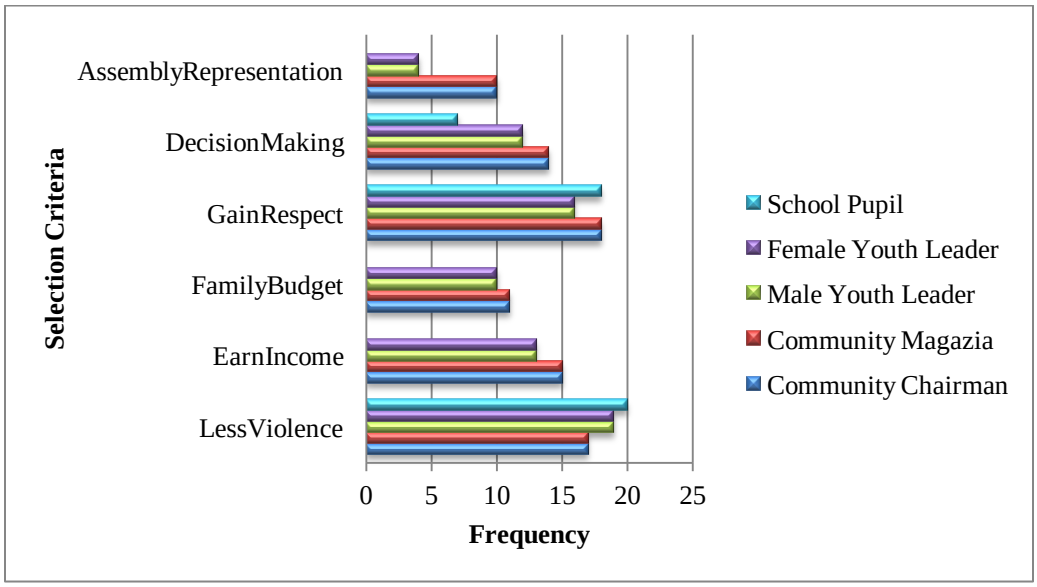

Figure 3: Distribution of Women's Rights Criteria Selection

Figure 3 is an illustration of the relationships between different selection criteria for women's rights. Seventeen (85%) each of chairmen and magazias believe that, when women begin to realize their rights, there will be less violence

against women. A greater number each, of male and female youth leaders, nineteen (95%) believe this. All pupils twenty (100%), involved in the study, agree with this.

An equal number fifteen (75%) of chairmen and magazia say women will get the chance to earn income. Also, thirteen (65%) each, of male youth and female youth leaders are of this view. However none of the school pupils (0%) consider, women earning income, to be a realization of rights.

Women, being able to contribute to the family budget, was one issue considered under women's rights. Eleven (55%) chairmen and eleven (55%) magazia said yes. Ten (50%) male youth leaders and an equal proportion of their female counterparts said they expected this criteria to be one result of women's rights work. Here again, no pupil (0%), thought it was an issue.

Would women gain the respect of their husbands? Eighteen (90%) of chairmen, eighteen (90%) of magazias and same proportion of pupils say so, while sixteen (80%) each of male and female youth leaders agree.

For decision making, there is a gradual decrease from community chairmen through pupils as follows; fourteen (70%) chairmen, fourteen (70%) magazias, twelve (60%) male youth leaders, twelve (60%) female youth leaders and seven (35%) pupils.

Improved assembly representation by women, considered as a possible result yielded the following; ten (50%) each of chairmen and magazias selected this criteria, followed by four (20%) of male and female youths. No pupil (0%) selected assembly representation.

Food Rights

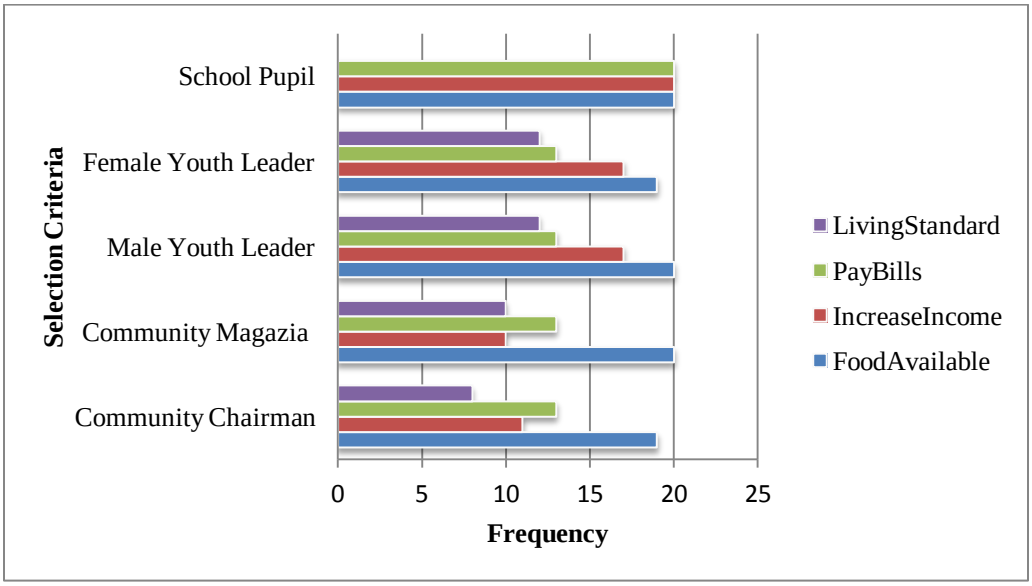

Figure 4: Distribution of Food Rights Criteria Selection

Availability of food is highly considered to be a result of food rights programmes. Twenty (100%) each of magazias, male youth leaders and school pupils indicated this while an equally good number of nineteen (95%) of chairmen and female youth leaders agreed with them. Twenty (100%) pupils said incomes would increase. Seventeen (85%) of male and female youth leaders agreed with them, while eleven (55%) chairmen and ten (50%) magazia chose this as a criteria. Whereas all twenty (100%) pupils thought it would make it easier to pay school fees and medical bills, thirteen (65%) each, of all other groups were of this view. There were generally average scores for improvement in the standard of living. These were eight (40%), ten (50%), twelve (60%), twelve (60%) and zero (0%) for chairmen, magazias, male, female youth and pupils in that order.

Correlation Analysis

Table 4 shows the correlation coefficients between pairs of variables under study. The definitions of the variables are stated in Chapter 1 under Data Collection. We see that the highest correlation coefficient of 0.754 occurs between the variables X_8 (Earn Income) and X_9 (Family Budget). This means that increased income enables people to put more money in the family budget. The second highest is 0.520 and occurs between the variables X_{11} (Decision Making) and X_{12} (Assembly Representation). This means that the more women get the chance to represent their communities, the more they are enabled to participate in decision making concerning their communities at the assembly level. The lowest correlation coefficient of 0.017 occurs between X_1 (Comfort Learning) and X_6 (Enlightenment). Existence of good classrooms is not related to enlightenment in the community. The second lowest correlation 0.024 is between X_1 (Comfort Learning) and X_5 (Raise Literacy). This means existence of good classroom accommodation may not necessarily mean there is raised literacy in the community. There is little in common between X_1 (Comfort Learning) and X_6 (Enlightenment). There is also little in common between X_1 (Comfort Learning) and X_5 (Raise Literacy).

Table 4: Correlation Matrix

Variable	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	X_{11}	X_{12}	X_{13}	X_{14}	X_{15}	X_{16}
X_1	1.000															
X_2	-0.189	1.000														
X_3	-0.197	0.062	1.000													
X_4	-0.212	-0.170	**0.202**	1.000												
X_5	0.024	-0.170	-0.471	0.083	1.000											
X_6	0.017	-0.309	-0.327	0.082	**0.492**	1.000										
X_7	-0.119	0.054	0.073	0.060	-0.090	0.119	1.000									
X_8	-0.009	-0.101	-0.279	**0.345**	**0.510**	**0.356**	-0.261	1.000								
X_9	-0.007	0.082	-0.169	**0.364**	**0.364**	**0.371**	0.102	**0.754**	1.000							
X_{10}	0.169	-0.189	**0.278**	**0.259**	-0.094	-0.098	0.093	-0.242	-0.357	1.000						
X_{11}	0.132	-0.179	-0.066	-0.017	0.108	0.100	-0.246	-0.206	-0.362	0.250	1.000					
X_{12}	0.123	-0.056	-0.154	0.055	0.236	0.287	-0.309	0.104	0.101	0.123	0.520	1.000				
X_{13}	0.148	-0.067	-0.112	-0.117	0.029	-0.158	-0.042	0.017	-0.023	-0.058	-0.119	-0.229	1.000			
X_{14}	-0.233	**0.331**	0.167	-0.189	-0.377	-0.081	0.170	-0.326	-0.304	0.166	0.176	0.103	-0.082	1.000		
X_{15}	0.134	**0.230**	0.154	-0.145	-0.236	-0.063	0.144	-0.104	-0.101	0.262	-0.022	0.141	-0.089	**0.309**	1.000	
X_{16}	-0.007	-0.181	-0.085	**0.405**	0.199	**0.208**	0.102	**0.264**	**0.261**	0.168	0.133	0.101	-0.168	-0.257	-0.056	1.000

Using a correlation value of 0.2 or greater as good and examining the pair wise correlations, we see that the following groups of relationships exist in the correlation table.

Table 5: Correlation among Variables

Group	Correlated Variables
1	$X_{2,}$ $X_{14,}$ X_{15}
2	$X_{3,}$ $X_{4,}$ X_{10}
3	$X_{4,}$ $X_{8,}$ $X_{9,}$ X_{16}
4	$X_{5,}$ $X_{6,}$ $X_{8,}$ X_{9}
5	$X_{6,}$ $X_{8,}$ $X_{9,}$ X_{16}

Test of Hypothesis

Haven established that relationships exist among some of the variables, we proceed to determine an appropriate method for analysis. The factor analysis with principal components analytical process is based on a matrix of correlations between the criteria variables. For factor analysis to be appropriate the variables must be correlated. It is expected that the variables that highly correlate with each other would also highly correlate with the same factor or factors. The Kaiser-Meyer-Olkin statistic is a measure of sampling adequacy and therefore is used to examine the appropriateness of factor analysis. The index compares the magnitudes of the observed correlation coefficients to the magnitudes of the partial correlation coefficients. It also indicates the proportion of variance in the variables that might be caused by underlying factors. Small values of the KMO statistic, less than 0.5, indicate that the correlations between pairs of variables can not be explained by other variables and that factor analysis may not be

appropriate. Generally a value between 0.5 and 1 is desirable. The value of the KMO measure of sampling adequacy, 0.596, is greater than 0.5. Also the sample size of 100 is more than 5 times the number of criteria variables, that is, 80. The groupings of correlated variables are therefore supported by the KMO test. Thus factor analysis is an appropriate method for analyzing the data.

Summary of Preliminary Analysis

The chart analysis showed that comfortable classroom accommodation is the greatest need in Education Rights. In Women's Rights, the greatest benefit will be a reduction in violence against women and children. The expectation of people is that a Food Rights programme will make more food available.

The correlation analysis showed the strongest relationship between any two variables occurs when, increased income enables people to put more money in the family budget. This was closely followed by the strong relationship that women get the chance to contribute to decision making about the development of their communities when they are in the district assembly. The analysis showed community members see little in common between good classroom accommodation, and hence, comfortable learning environment and enlightenment. There was also little in common between comfortable learning environment and improved or raised literacy in the community.

The presence of five different groups of pair wise correlated variables, suggested that relationships exist among the variables. The Kaiser-Meyer-Olkin (KMO) test confirmed this and therefore the appropriateness of factor analysis for analyzing the data.

CHAPTER FOUR

FURTHER ANALYSIS

This chapter uses factor analysis with principal components extraction to focus the selection of projects on a manageable subset of the sixteen predictors that were used in the study.

Communalities of the Study Variables

The amount of variance a criteria variable shares with all other criteria variables included in the analysis is referred to as communality. This is also the proportion of variance explained by the common factors (Norusis, 2004).

The initial communalities are estimates of the variance in each variable accounted for by all factors. For principal components extraction, this is always equal to 1.0 for correlation analyses.

Extraction communalities are estimates of the variance in each variable accounted for by the factors. The communalities in Table 6 are mostly high, which indicates that the extracted factors represent the correlations among the variables well.

Table 6: Table of Communalities

Variable	Initial	Extraction
Comfort Learning	1.000	0.763
Increase Interest	1.000	0.661
Good Teachers	1.000	0.646
Improve Teaching	1.000	0.769
Raise Literacy	1.000	0.646
Enlightenment	1.000	0.728
Less Violence	1.000	0.859
Earn Income	1.000	0.826
Family Budget	1.000	0.862
Gain Respect	1.000	0.723
Decision Making	1.000	0.765
AssemblyRepresentation	1.000	0.771
Food Available	1.000	0.428
Increase Income	1.000	0.663
Pay Bills	1.000	0.777
Living Standard	1.000	0.521

Total Variance Explained

Table 7 shows the variance explained by the initial solution. The "Total" column gives the eigenvalue, or amount of variance in the original data accounted for by each component. The "% of Variance" column gives the ratio, expressed as a percentage, of the variance accounted for by each component to the total

variance in the data obtained from respondents for selection of projects. The Cumulative % column gives the percentage of variance accounted for by the first components. For example, the cumulative percentage for the second component is the sum of the percentage of variance for the first and second components.

Table 7: Eigenvalues of Components

Component	Total	% of Variance	Cumulative %
1	3.380	21.128	21.128
2	2.171	13.568	34.696
3	1.851	11.569	46.265
4	1.568	9.801	56.066
5	1.262	7.890	63.956
6	1.177	7.354	71.310
7	0.853	5.333	76.643
8	0.788	4.923	81.566
9	0.608	3.802	85.368
10	0.557	3.484	88.852
11	0.490	3.063	91.915
12	0.409	2.557	94.472
13	0.335	2.092	96.564
14	0.294	1.839	98.403
15	0.173	1.082	99.484
16	0.083	0.516	100.000

For the initial solution, there are as many components as criteria variables, and in factor analysis, the sum of the eigenvalues equals the number of

components. Haven requested that eigenvalues greater than 1, be extracted, in the use of SPSS, the first six principal components form the extracted solution. The eigen values are less than 1, from component 7 to component 16.

Table 8: Variance Explained by the First Six Components

	Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %
1	3.380	21.128	21.128
2	2.171	13.568	34.696
3	1.851	11.569	46.265
4	1.568	9.801	56.066
5	1.262	7.890	63.956
6	1.177	7.354	71.310

Table 8 shows the 6 extracted components reproduced here from Table 7. They explain 71% of the variability in the original 16 variables, so the complexity of the data set is considerably reduced by using these 6 components.

Table 9: Rotation Sums of Squared Loadings

	Rotation Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %
1	2.424	15.148	15.148
2	2.148	13.428	28.575
3	1.954	12.210	40.785
4	1.776	11.099	51.884
5	1.590	9.937	61.820
6	1.518	9.490	71.310

The 'Total' columns of Tables 8 and 9 show that the rotation maintains the cumulative percentage of variation explained by the extracted components, but that variation is now spread more evenly over the components. The large changes in the individual totals suggest that the rotated component matrix will be easier to interpret than the unrotated matrix.

Scree Plot

The scree plot is of great help in determining the optimal number of factors. The eigenvalue in the initial solution is plotted against the corresponding factor. The shape of the plot is used to determine the number of factors. The plot has a distinct break between the steep slope of factors, with large eigenvalues and a gradual trailing off associated with the rest of the factors. The gradual trailing off is referred to as the scree. Experimental evidence indicates that the point at which the scree begins denotes the true number of factors.

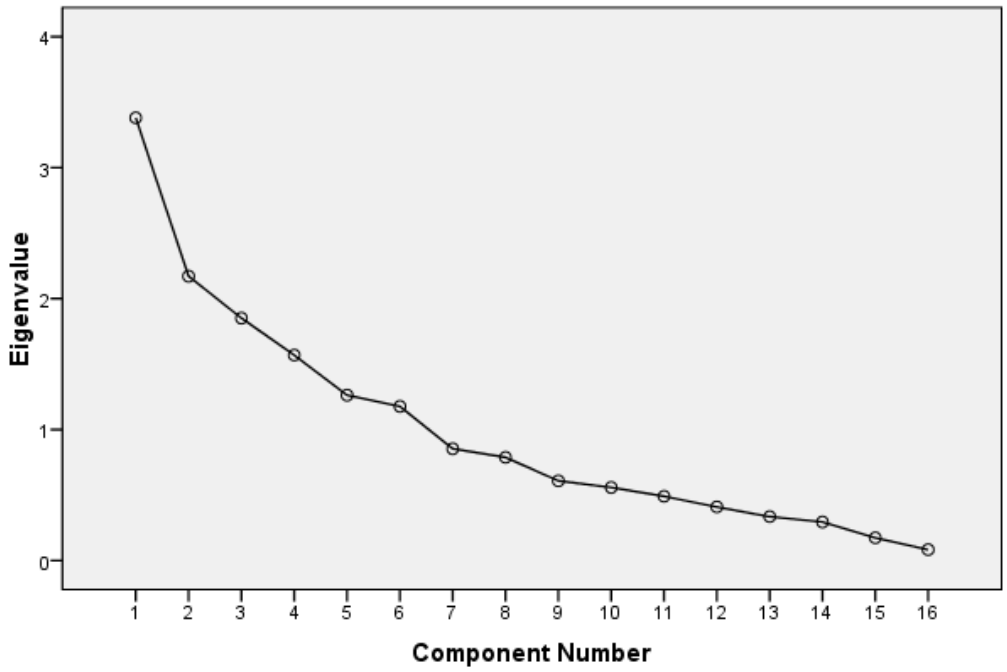

Figure 5: Scree Plot

Figure 5 shows that the scree begins at factor 2.

Factor Matrix

The factor matrix contains the coefficients used to express the standardized variables in terms of the factors. These coefficients, the factor loadings, represent the correlations between the factors and the variables. A coefficient with a large absolute value indicates that the factor and the variable are closely related. The coefficients of the factor matrix can be used to interpret the factors. In this study, an absolute value factor loading greater than 0.6, is considered as high, for interpretation of factors.

Unrotated Factor Matrix

Table 10 gives the unrotated factor matrix.

Table 10: Unrotated Factor Matrix

	Factor					
Variable	**1**	**2**	**3**	**4**	**5**	**6**
Comfort Learning	0.069	0.310	-0.373	-0.287	0.453	0.485
Increase Interest	-0.312	-0.366	-0.022	0.592	-0.143	0.241
Good Teachers	-0.487	-0.083	0.534	-0.166	-0.245	0.171
Improve Teaching	0.365	0.025	0.728	-0.208	-0.225	0.103
Raise Literacy	0.741	0.154	-0.188	0.079	0.077	-0.158
Enlightenment	0.607	0.239	0.027	0.283	0.328	-0.338
Less Violence	-0.149	-0.281	0.399	0.079	0.659	-0.398
Earn Income	0.808	-0.181	0.071	0.140	-0.111	0.323
Family Budget	0.734	-0.376	0.210	0.263	0.063	0.253
Gain Respect	-0.281	0.532	0.440	-0.287	0.236	0.173
Decision Making	-0.061	0.826	-0.102	0.038	-0.206	-0.156
AssemblyRepresentation	0.231	0.697	-0.050	0.414	-0.170	0.173
Food Available	-0.022	-0.246	-0.397	-0.400	0.155	0.162
Increase Income	-0.572	0.130	0.102	0.536	0.033	-0.145
Pay Bills	-0.346	0.150	0.167	0.400	0.448	0.496
Living Standard	0.440	0.218	0.500	-0.144	0.097	-0.011

Factor 1 is correlated with 4 variables; ‘raise literacy in community’, ‘increase enlightenment and development’, ‘women get the chance to earn income’ and ‘women contribute to the family budget’. Factor 2 is closely related with 2 variables; ‘women contribute to decision making in the home’ and ‘women represent their communities at the Assembly’. Factors 3 and 5 are related to only one variable each; ‘improve teaching and learning’ and ‘there is less violence against women’ respectively. Factors 4 and 6 are not related to any of the variables. Only 2 of the 6 factors are correlated with 2 or more variables.

We are not able to get a good solution and there is a difficulty in interpreting the factors.

Rotated Factor Matrix

Table 11 is a rotation of the factor matrix. This is a simpler matrix that is easier to interpret. Each factor has significant loading for more of the variables and each variable has significant loadings with only a few factors. Rotation does not affect the communalities and the percentage of total variance explained. Only the percentage of variance accounted for by each factor changes.

Interpret Factors

The rotated factor matrix helps to determine what the factors represent. Factor 1 is highly correlated with X_8 (women get the chance to earn income) and X_9 (women contribute to the family budget). Therefore this factor is labeled as ‘women economic empowerment’ factor. Factor 2 is highly correlated with X_3 (attract good teachers to the community), X_5 (raise literacy in community) and X_6

(increase enlightenment and development). Factor 2 is an 'opportunity for education' factor.

Table 11: Rotated Factor Matrix

	Factor					
Variable	**1**	**2**	**3**	**4**	**5**	**6**
Comfort Learning	-0.056	0.138	0.058	0.169	0.291	-0.790
Increase Interest	0.226	-0.287	-0.514	-0.035	0.383	0.340
GoodTeachers	-0.121	-0.697	0.277	-0.087	0.100	0.227
Improve Teaching	0.385	-0.182	0.715	0.009	-0.146	0.234
Raise Literacy	0.325	0.667	0.094	0.168	-0.226	-0.080
Enlightenment	0.144	0.804	0.198	-0.003	0.032	0.144
Less Violence	-0.190	0.218	0.190	-0.790	0.272	0.203
Earn Income	0.842	0.259	0.129	0.146	-0.094	-0.058
Family Budget	0.870	0.266	0.103	-0.131	0.044	0.066
Gain Respect	-0.388	-0.190	0.629	0.105	0.333	-0.136
Decision Making	-0.477	0.215	0.198	0.667	-0.004	0.088
AssemblyRepresentation	0.022	0.316	0.117	0.747	0.277	0.149
Food Available	0.007	-0.092	-0.212	-0.181	-0.176	-0.558
Increase Income	-0.389	-0.100	-0.249	0.020	0.460	0.477
Pay Bills	-0.023	-0.114	-0.004	-0.004	0.871	-0.064
Living Standard	0.216	0.196	0.656	0.006	-0.025	0.070

Factor 3, on the other hand, is highly correlated with X_4 (improve teaching and learning), X_{10} (women gain respect of their husbands) and X_{16} (improve standard of living). Factor 3 is an 'improved quality of life' factor. Factor 4 is correlated with X_7 (there is less violence against women), X_{11} (women contribute to decision making in the home) and X_{12} (women represent their communities at the Assembly). Factor 4 is 'women social empowerment' factor. Factor 5 is correlated with X_{15} (pay school fees and medical bills) whilst factor 6 is correlated with X_1 (comfortable and safe learning environment). We ignore factors 5 and 6 as they are related to only single indicators.

Summary of Further Analysis

Further analysis considered factor analysis of the data. The eigen value greater than 1 rule suggested that six factors might underlie judgment into selection of projects (decisions for projects). The Scree plot suggested that there could be two factors. Thus these two rules show that factors underlying decisions for projects might lie between 2 and 6.

The unrotated matrix failed to give a good solution and we were not able to interpret the factors.

Following the rotation of the initial six factor solution, the first factor was identified to be women economic empowerment, second, education, third, quality of life and fourth, women social empowerment. The fifth and sixth factors each loaded highly on single indicators. The interpretations of these factors were therefore considered, not meaningful.

CHAPTER FIVE

SUMMARY, DISCUSSION AND CONCLUSIONS.

This chapter provides an assessment of the findings of the preliminary and further analysis, concluding with suggested recommendations that are informed by the broad results of the study.

Summary

This study considered the statistical judgment into the selection of social development projects in Education Rights, Womens' Rights and Food Rights. The area of study is Tamale in the Northern Region of Ghana. The data used in the study were obtained from the communities where ActionAid Ghana operates. The data were generated by participatory rural appraisal techniques.

The main technique for analysis used in this study is Factor Analysis. Using this technique, a number of observations have been made.

The preliminary analysis results showed that comfortable classroom accommodation is the greatest need in Education Rights. In Women's Rights, the greatest benefit will be a reduction in violence against women and children. The expectation of people is that a Food Rights programme will make more food available.

The correlation analysis showed the strongest relationship between any two variables occurs when, increased income enables people to put more money in the family budget. This was closely followed by the strong relationship that

women get the chance to contribute to decision making about the development of their communities when they are in the district assembly. The analysis showed community members see little in common between good classroom accommodation, and hence, comfortable learning environment and enlightenment. There was also little in common between comfortable learning environment and improved or raised literacy in the community.

The presence of five different groups of pair wise correlated variables, suggested that relationships exist among the variables. The Kaiser-Meyer-Olkin (KMO) test confirmed this and therefore the appropriateness of factor analysis for analyzing the data.

Further analysis considered factor analysis of the data. The eigen value greater than 1 rule suggested that six factors might underlie judgment into selection of projects (decisions for projects). The Scree plot suggested that there could be two factors. Thus these two rules show that factors underlying decisions for projects might lie between 2 and 6.

The unrotated matrix failed to give a good solution and we were not able to interpret the factors.

Following the rotation of the initial six factor solution, the first factor was identified to be women economic empowerment, second, education, third, quality of life and fourth, women social empowerment. The fifth and sixth factors each loaded highly on single indicators. The interpretations of these factors were therefore considered, not meaningful.

This study revealed that overall people give importance to practical needs than strategic needs. Community members want an increase in availability of food from a development project. They give least importance to the opportunity for women to be able to represent their communities at the assembly. The criterion of most importance in education is availability of a comfortable and safe learning environment. Of least importance is increased enlightenment and development. For women's rights people expect there will be less violence against women. The least selected is 'women represent their communities in the assembly'. On food rights, people consider making food available very important whilst, an improved standard of living, is given the least importance.

Discussion

Food is a practical and physiological need. Actually, across the world, 854 million people are chronically hungry. Assembly representation by women is a power relations, participation and psychosocial need which when addressed will enable that section of the population realize a right; representation and contribution to discussions at the assembly and subsequent creation of the appropriate conditions so women may perform their roles in the community with less burden. Women will bring issues affecting women and children better to the floor of the assembly for discussion. Strategic needs of women and children will be addressed.

Women's rights work includes income generating programmes for women. When women get the chance to earn income, there is an increase in the family income as they contribute to the family budget. Subsequently families are

able to attend to responsibilities like paying school fees, providing school uniforms and school needs for children and paying medical bills. Their families begin to enjoy such things as nutritious and healthy meals through the use of readily available healthy food substances in the community. There is an improvement in quality of life, which is one of four main findings of this study. Becoming economically empowered, another key finding, and contributing to the family budget, women begin to gain the respect of their husbands and other family members. They are able then to affect traditional and cultural practices that do not work in their favour. When they begin to gain respect they are able to participate in decision making at the home. They also experience less violence from their husbands and other male members of the household. This is reinforced by the organization's work to provide information and education to reduce violence against women, which is a key Rights issue. Power relationships within the household begin to transform and shift in favour of women. This new found empowerment then goes beyond the household, with women beginning to gain recognition in the community, being able to actively participate in community discussions and meetings and have their views taken. This recognition of the worth and potential, they have, eventually leads to them being able to stand for consideration for election into the local legislature. Once in the legislature women are able to bring issues of concern to their fellow women and men, better, to the assembly. Women are socially empowered in the process, a key finding of this study. Social development work using the Rights Based Approach means working in line with the principles of human rights. Human rights principles include

participation, empowerment, equality and equity (AAG CSP III, 2005). The result is an increase in opportunity for women to realize their rights.

Formal education, a key finding, enables us to take better control of our lives, interact with our environment better and therefore make good use of opportunities around for community development. A comfortable learning environment characterized by good classroom accommodation no doubt is rewarding and attractive for both teachers and pupils and serves as a motivation for teaching and learning. Children are able to concentrate better when they have good classrooms fitted with appropriate furniture. Classes do not have to stop when there is rain or wind and therefore teacher pupil contact hours are good. Children do not lie on the floor hence their uniforms remain neat for longer periods. The uniforms are washed less frequently and therefore last longer, creating a saving on money that would otherwise have been used to replace these uniforms. Less money is spent on buying soap. Text books that do not have to be placed on the floor last longer and may be used by several pupils year after year.

The study revealed that community members prefer support that meets their practical needs like food, income and structures like classroom accommodation. It is important for development agencies to sensitize and create awareness so communities begin to realize that these agencies are only complementing what government is supposed to provide them as a right. Furthermore communities should be given skill and knowledge through training, in such areas as advocacy, campaigning for change and negotiation on their rights.

Experience in social development work over the years has shown that development is sustainable when the root causes of the problem are addressed instead of the symptoms. The denial of rights is identified as the main cause of poverty. Denial of rights is in turn the result of unequal power relationships between duty bearers i.e. government and rights holders, the populace. It may also be observed between groups, e.g. men and women at the community level.

Conclusions and Recommendation

The main objective of this study has been to identify the statistical judgement into the selection of social development projects in the Tamale area of the Northern Region of Ghana. The data used for the study were generated on the community responses on various criteria for the determination of such projects.

Factor analysis of the data has identified a four-factor solution that underlies decisions for project selection. The first most important factor is economic empowerment. The second most important factor is education. The other two factors which cannot be ignored are quality of life and social empowerment.

The findings of the study suggest that in the selection of social development projects the primary consideration that should be established is the impact on the economic empowerment of the community. This can serve as a useful guide to both NGOs and the government in the determination of projects for communities that have similar characteristics as those in the Tamale area of the Northern Region of Ghana.

REFERENCES

ActionAid Ghana. (1995). *Country strategy paper one*. Accra: ActionAid Ghana.

ActionAid Ghana. (1998). *Tamale community report.* Tamale: Achuliwor J.S.

ActionAid Ghana. (2005). *Country strategy paper three*. Accra: ActionAid Ghana.

Anderson, T. W. (1984). *An introduction to multivariate statistical analysis.* (2nd ed.). New York: John Wiley & Sons Inc.

Chatfield, C., & Collins, A. J. (1980). *Introduction to multivariate analysis*. London: Chapman & Hall.

Dossel, D. P., & Gounder, R. (1994). Theory and measurement of living levels: Some empirical results for the human development index. *World Development, 26* (3), 517–528.

Ghana Statistical Service. (1994). *Ghana demographic and health survey 1993*. Calverton, MD: Macro International Inc.

Ghana Statistical Service. (1995). *The pattern of poverty in Ghana: 1988-1992*. Accra: Ghana Statistical Service.

Ghana Statistical Service. (2000). *Ghana living standards survey: Report of the fourth round 1998/1999.* Accra: Ghana Statistical Service.

Ghana Statistical Service. (2005). *2000 population and housing census reports: Analysis of district data and implications for planning. Northern Region.* Accra: Ghana Statistical Service.

Gorsuch, R. L. (1983). *Factor analysis*. (2nd ed.). Hillsdale, New Jersey: Lawrence Erlbaum Associates.

Harman, H. H. (1976). *Modern factor analysis*. (3rd ed.). Chicago: University of Chicago Press.

Johnson, R. A., & Wichern, D.W. (1992). *Applied multivariate statistical analysis*. (3rd ed.). London: Prentice Hall International.

Kim, J., & Mueller, C. W. (1978a). *Factor analysis: Statistical methods and practical issues*. Beverly Hills: Sage Publications.

Kim, J., & Mueller, C. W. (1978b). *Factor analysis: What it is and how to do it*. Beverly Hills: Sage Publications.

Kline, P. (1994). *An easy guide to factor analysis*. London: Routledge.

Martinussen, J. (1997). *Society, state and market: A guide to competing theories of development.* London: Zed Books Ltd.

National Development Planning Commission. (1995). *Ghana-vision 2020: Policies for the preparation of the 1996-2000 development plan*. Accra: Ghana Government Ministry of Information.

Norusis, M. (2004). *SPSS 13.0 statistical procedures companion*. New Jersey: Prentice Hall Inc.

Sen, A. (1988). The concept of development: In H. Chenery & T.N. Srinivasan (Eds.), *Handbook of development economics.* (pp. 9-26). New York: Elsevier.

Sharma, S. (1996). *Applied multivariate techniques.* New York: John Wiley & Sons Inc.

Shaw, P.J.A. (2003). *Multivariate statistics for the environmental sciences.* London: Hodder Arnold.

Sowa, N. K. (1992). *An overview of the poverty situation in Ghana.* Accra: Ghana Statistical Service.

Streeten, P. (1981). *First things first: Meeting basic human needs in developing countries*. London: Oxford University Press.

Streeten, P. (1994). *Strategies for human development: Global poverty and unemployment*. Copenhagen: Handelshøjskolens Forlag / Munksgaard International Publishers.

The World Bank. (2001). *World development report 2000/2001: Attacking poverty*. Washington, DC: Oxford University Press.

United Nations Development Programme. (1990). *Human development report 1990: Concept and measurement of human development*. New York: Oxford University Press.

United Nations Development Programme. (2007). *Ghana human development report 2007: Towards a more inclusive society*. Accra: United Nations Development Programme, Ghana Office.

APPENDICES

APPENDIX 1

Table 12: Component Score Coefficient Matrix

	Component					
	1	2	3	4	5	6
Comfort Learning	0.018	0.034	0.047	0.051	0.277	-0.557
Increase Interest	0.214	-0.134	-0.273	0.064	0.238	0.188
Good Teachers	0.044	-0.359	0.184	0.021	0.003	0.100
Improve Teaching	0.170	-0.198	0.363	0.030	-0.078	0.130
Raise Literacy	0.035	0.281	-0.005	0.034	-0.078	-0.005
Enlightenment	-0.071	0.432	0.056	-0.108	0.067	0.127
Less Violence	-0.174	0.278	0.137	-0.536	0.173	0.103
Earn Income	0.372	-0.028	0.015	0.113	0.054	-0.041
Family Budget	0.376	0.024	0.013	-0.052	0.146	0.023
Gain Respect	-0.133	-0.079	0.362	0.015	0.193	-0.144
Decision Making	-0.231	0.105	0.075	0.330	-0.069	0.095
AssemblyRepresentation	0.041	0.090	0.004	0.405	0.181	0.105
Food Available	0.008	-0.057	-0.082	-0.096	-0.069	-0.366
Increase Income	-0.123	0.065	-0.123	0.012	0.215	0.295
Pay Bills	0.114	-0.021	0.018	-0.007	0.600	-0.136
Living Standard	0.044	0.045	0.328	-0.040	0.020	0.033

APPENDIX 2

Questionnaire

UNIVERSITY OF CAPE COAST

FACULTY OF SCIENCE

SCHOOL OF PHYSICAL SCIENCES

DEPARTMENT OF MATHEMATICS AND STATISTICS

QUESTIONNAIRE FOR STATISTICAL JUDGEMENT INTO SELECTION OF ACTIONAID PROJECTS BY COMMUNITIES IN TAMALE.

This exercise is for an academic purpose. The objective is to determine communities' criteria for selecting each of three projects, ActionAid Ghana, an NGO, provides. It will be appreciated if you could take some time to complete it. Your answers will be treated as confidential.

1. What is your position in the community?

   Community Chairman [ ]

   Community Magazia (Women's Leader) [ ]

   Male Youth Leader [ ]

   Female Youth leader [ ]

   School Pupil [ ]

2. Why do you want a school block to be constructed in your community?

   Please tick as many as apply.

   Comfortable and safe learning environment [ ]

   Increase interest in schooling by children and parents [ ]

   Attract good teachers to the community. [ ]

Improve teaching and learning. [ ]

Raise literacy in community [ ]

Increase enlightenment and development. [ ]

3. Why do you want ActionAid to do work that will get women their Rights?

Please tick as many as apply.

There is less violence against women. [ ]

Women get the chance to earn income. [ ]

Women contribute to the family budget. [ ]

Women gain respect of their husbands. [ ]

Women contribute to decision making in the home [ ]

Women represent their communities at the Assembly [ ]

4. Why do you want a food crop production and animal rearing programme?

Please tick as many as apply.

Make food available [ ]

Increase income [ ]

Pay school fees and medical bills [ ]

Improve standard of living [ ]

APPENDIX 3

Table 14: Coded Data

Respondent	ComfortLearning	IncreaseInterest	GoodTeachers	ImproveTeaching	RaiseLiteracy	Enlightenment	LessViolence	EarnIncome	FamilyBudget	GainRespect	DecisionMaking	AssemblyRepresentation	FoodAvailable	IncreaseIncome	PayBills	LivingStandard
1-20 Chairmen																
1	1	1	0	1	1	0	1	1	1	1	0	0	1	0	0	1
2	1	1	0	1	1	1	1	1	1	1	1	1	1	1	0	0
3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
4	1	1	0	0	1	0	0	1	0	1	1	1	1	1	1	0
5	1	1	1	1	0	0	0	1	0	1	1	0	1	1	0	0
6	1	1	0	0	1	1	1	1	1	0	0	0	1	0	1	0
7	1	0	1	1	1	0	1	0	0	1	1	0	1	0	0	1

8	1	1	0	0	1	0	1	0	0	1	1	1	1	1	1	0
9	1	1	0	0	1	1	1	0	0	1	1	1	1	1	0	0
10	1	1	1	1	1	0	1	1	1	1	0	0	1	0	1	0
11	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1
12	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1
13	1	0	1	1	1	1	0	1	0	1	1	1	1	0	1	0
14	1	1	0	0	1	0	1	1	0	1	1	0	1	1	1	0
15	1	1	0	0	1	1	1	1	1	0	0	0	1	0	1	0
16	1	1	1	1	1	0	1	0	0	1	1	0	1	0	0	1
17	1	1	0	1	1	0	1	0	0	1	1	1	1	1	1	0
18	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
19	1	0	0	1	1	1	1	1	1	1	0	0	1	0	1	0
20	1	0	1	1	1	1	1	1	1	1	0	0	1	0	0	1
TL	**20**	**15**	**9**	**14**	**19**	**11**	**17**	**15**	**11**	**18**	**14**	**10**	**19**	**11**	**13**	**8**

21-40 Magazias

21	1	0	1	1	1	1	1	1	1	1	0	0	1	0	0	1
22	1	0	0	1	1	1	1	1	1	1	0	0	1	0	0	1
23	1	1	0	1	1	1	1	1	1	1	1	1	1	0	1	0
24	1	1	0	1	1	1	1	0	0	1	1	1	1	1	1	0
25	1	1	1	1	1	0	1	0	0	1	1	0	1	0	0	1
26	1	1	0	0	1	1	1	1	1	0	0	0	1	0	1	1

27	1	1	0	0	1	0	1	1	0	1	1	0	1	1	1	0
28	1	0	1	1	1	1	0	1	0	1	1	1	1	0	1	0
29	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1
30	1	1	0	1	1	0	1	1	1	1	0	0	1	0	0	1
31	1	1	1	1	1	0	1	1	1	1	0	0	1	0	1	0
32	1	1	0	0	1	1	1	0	0	1	1	1	1	1	0	0
33	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
34	1	1	0	0	1	0	1	0	0	1	1	1	1	1	1	0
35	1	0	1	1	1	0	1	0	0	1	1	0	1	0	0	1
36	1	1	0	0	1	1	1	1	1	0	0	0	1	0	1	0
37	1	1	1	1	0	0	0	1	0	1	1	0	1	1	0	0
38	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
39	1	1	0	0	1	0	0	1	0	1	1	1	1	1	1	0
40	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
TL	**20**	**15**	**9**	**14**	**19**	**12**	**17**	**15**	**11**	**18**	**14**	**10**	**20**	**10**	**13**	**10**

41-60 Male Youth Leaders

41	1	1	0	1	0	1	1	1	1	1	0	0	1	1	1	1
42	1	1	0	1	0	0	1	0	0	1	1	0	1	1	1	1
43	1	1	1	1	0	0	1	1	1	1	0	0	1	0	1	1
44	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1
45	0	1	1	1	1	0	1	1	1	1	0	0	1	1	1	0

46	1	0	1	0	0	1	1	0	0	1	1	1	1	1	1	0
47	1	0	0	1	1	1	1	1	0	1	1	0	1	0	0	1
48	1	1	0	0	1	0	0	1	1	0	1	1	1	0	0	1
49	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	0
50	1	0	0	0	1	1	1	1	0	1	1	0	1	1	1	1
51	0	1	1	1	1	0	1	1	0	1	0	0	1	1	1	1
52	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1
53	0	1	1	1	0	1	1	0	0	1	1	1	1	1	1	1
54	1	1	0	0	1	1	1	0	0	1	1	0	1	1	1	1
55	0	1	1	1	0	0	1	0	0	1	1	0	1	1	1	1
56	0	1	0	1	1	1	1	1	1	0	0	0	1	1	0	0
57	1	1	0	0	1	1	1	1	1	0	0	0	1	1	0	0
58	0	1	1	1	0	0	1	1	1	0	0	0	1	1	0	0
59	0	1	1	0	1	1	1	0	0	1	1	0	1	1	0	0
60	1	0	1	1	0	0	1	0	0	1	1	0	1	1	0	0
TL	**13**	**16**	**12**	**14**	**11**	**11**	**19**	**13**	**10**	**16**	**12**	**4**	**20**	**17**	**13**	**12**

61-80 Female Youth Leaders

61	1	0	1	1	0	0	1	0	0	1	1	0	1	1	0	0
62	0	1	1	0	1	1	1	0	0	1	1	0	1	1	0	0
63	0	1	1	1	0	0	1	1	1	0	0	0	1	1	0	0
64	1	1	0	0	1	1	1	1	1	0	0	0	1	1	0	0

65	0	1	0	1	1	1	1	1	1	0	0	0	1	1	0	0
66	0	1	1	1	0	0	1	0	0	1	1	0	1	1	1	1
67	1	1	0	0	1	1	1	0	0	1	1	0	1	1	1	1
68	0	1	1	1	0	1	1	0	0	1	1	1	0	1	1	1
69	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1
70	0	1	1	1	1	0	1	1	0	1	0	0	1	1	1	1
71	1	1	0	1	0	1	1	1	1	1	0	0	1	1	1	1
72	1	1	0	1	0	0	1	0	0	1	1	0	1	1	1	1
73	1	1	1	1	0	0	1	1	1	1	0	0	1	0	1	1
74	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1
75	0	1	1	1	1	0	1	1	1	1	0	0	1	1	1	0
76	1	0	1	0	0	1	1	0	0	1	1	1	1	1	1	0
77	1	0	0	1	1	1	1	1	0	1	1	0	1	0	0	1
78	1	1	0	0	1	0	0	1	1	0	1	1	1	0	0	1
79	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	0
80	1	0	0	0	1	1	1	1	0	1	1	0	1	1	1	1
TL	**13**	**16**	**12**	**14**	**11**	**11**	**19**	**13**	**10**	**16**	**12**	**4**	**19**	**17**	**13**	**12**

81-100 Pupils

81	1	1	1	0	0	0	1	0	0	1	1	0	1	1	1	0
82	1	1	1	0	0	0	1	0	0	1	1	0	1	1	1	0
83	1	1	1	0	0	0	1	0	0	1	1	0	1	1	1	0
84	1	1	1	0	0	0	1	0	0	1	1	0	1	1	1	0

85	1	1	1	0	0	0	1	0	0	1	0	0	1	1	1	0
86	1	1	1	0	0	0	1	0	0	0	1	0	1	1	1	0
87	1	1	1	0	0	0	1	0	0	1	0	0	1	1	1	0
88	1	1	1	0	0	0	1	0	0	1	0	0	1	1	1	0
89	1	1	1	0	0	0	1	0	0	1	0	0	1	1	1	0
90	1	1	1	1	0	0	1	0	0	1	0	0	1	1	1	0
91	1	1	1	0	0	0	1	0	0	1	0	0	1	1	1	0
92	1	1	1	0	0	0	1	0	0	0	1	0	1	1	1	0
93	1	1	1	0	0	0	1	0	0	1	0	0	1	1	1	0
94	1	1	1	1	0	0	1	0	0	1	1	0	1	1	1	0
95	1	1	1	0	0	0	1	0	0	1	0	0	1	1	1	0
96	1	1	1	0	0	0	1	0	0	1	0	0	1	1	1	0
97	1	1	1	0	0	0	1	0	0	1	0	0	1	1	1	0
98	1	1	1	0	0	0	1	0	0	1	0	0	1	1	1	0
99	1	1	1	1	0	0	1	0	0	1	0	0	1	1	1	0
10 0	1	1	1	1	0	0	1	0	0	1	0	0	1	1	1	0
TL	**20**	**20**	**20**	**4**	**0**	**0**	**20**	**0**	**0**	**18**	**7**	**0**	**20**	**20**	**20**	**0**
G																
R																
TL	**86**	**82**	**62**	**60**	**60**	**45**	**92**	**56**	**42**	**86**	**59**	**28**	**98**	**75**	**72**	**42**