Journal of Biology, Agriculture and Healthcare
ISSN 2224-3208 (Paper) ISSN 2225-093X (Online)
Vol.3, No.4, 2013

Illness and Food Security in Rufiji District, Tanzania

Kim A. Kayunze (Corresponding Author)
Development Studies Institute, Sokoine University of Agriculture, P. O. Box 3024, Morogoro, Tanzania, E-mails: kimkayunze@yahoo.com and kayunze@suanet.ac.tz
Eleuther A. Mwageni[2] Ardhi University, P. O. Box 35176, Dar es Salaam, Tanzania, E-mails: emwageni@yahoo.co.uk and mwageni@hotmail.com

Abstract
A socio-economic survey was conducted among 225 households comprising 1,193 individuals in Rufiji District, Tanzania, in 2006 to: (a) determine the number of people who were ill; (b) find the commonest illnesses; and (c) compare food security in households where members were ill for fewer days and where they were ill for more days. It was found that 13% of the individuals were ill during the survey and that the top ten illnesses were malaria (29.9%), joints/body pains (19.5%), fever (9.1%), chest/TB (5.8%), headache (5.8%), stomach ache (4.5%), asthma (3.3%), eyes (3.3%), UTI/STI (2.6%), and diarrhoea (2.0%). Multiple one-way ANOVA comparisons of mean differences in dietary energy consumed (DEC) in five groups of the households based on the number of days that the individuals were ill showed significant difference between the fourth and the fifth groups ($p = 0.021$). It is concluded that with few days of household members being ill food security in terms of DEC is affected little, but that with more days of illness, food security is substantially affected. Therefore, if health services are not improved in rural areas, particularly in Rufiji District, the problem of low food production leading to food insecurity will linger on. It is recommended that the Government and other stakeholders should scale-up health interventions in rural areas, among other strategies, in order to improve food security.
Key words: illness, food security, dietary energy consumed, health services

1. Introduction

Illness is an undesirable condition since it has many adverse effects on not only food security that is the central issue for this paper, but also on other development issues including worker productivity, use of natural resources, education pursuit, and expenditure on medical care. Although the adverse effects of illness are generally known, the extent to which illness explains food insecurity, particularly in Rufiji District, was scantily known since no research had been done there to quantify the linkage between the two aspects. Such quantification was worthwhile to generate empirical information on the extent to which illnesses are linked to crop production, food purchase, and dietary energy consumption, which are the main indicators of food security. The information can inform strategies to reduce the burden of diseases, with a view to improving food security through more concerted efforts to control illnesses.

In view of the above, the research for this paper was conducted in the Rufiji Demographic Health Surveillance System (HDSS) Area in September and October 2006 with the specific objectives to: a) determine the number of people who were ill, b) find the commonest illnesses, and c) compare food security in terms of dietary energy consumed per capita per day in households where members were ill for fewer days and where they were ill for more days. Cognisant of the fact that the term illness is broader than the term disease, and heeding the differences between the two terms that are given in Section 2.1, the term illness was used consistently in the sense of respondents' own and their household members' mental and physical experiences of ill health.

2. An Overview of Illness and Food Security

2.1 Illness, Disease, and Sickness

The concepts illness, disease, and sickness are used interchangeably by many people, but they are different. According to Wikman *et al*. (2005), illness is defined as the ill health that people identify themselves, often based on self reported mental or physical symptoms. They add that in some cases this may mean only minor or temporary problems, but in other cases self reported illness might include severe health problems or acute suffering; it may include health conditions that limit the person's ability to lead a normal life. Musing over this definition, one realises that illness is a wide concept subsuming the terms disease and sickness.

The term disease is defined by as "a state of complete physical, mental and social well-being, not merely the absence

of disease or infirmity" (WHO, 1946, cited by Scully, 2004). The definition has been praised for embracing a holistic viewpoint of what a disease is, but it has been strongly criticized as being wildly utopian. For example, Robert Hughes remarks that the definition is "more realistic for a bovine than for a human state of existence" (Hudson, 1993, cited by Scully, 2004). Criticisms against the WHO's definition of the term "disease" have led medical anthropologists and sociologists to come up with an argument that whether people believe that they are ill varies with class, gender, ethnic group and less obvious factors such as proximity to support from family members. Another argument is that what counts as a disease also changes historically, partly as a result of increasing expectations of health due to changes in diagnostic ability, but mostly for a mixture of social and economic reasons (Scully, 2004)). He supports his argument with an example of osteoporosis, which was officially recognized by WHO in 1994 as a disease, unlike previously when it was regarded as a normal ageing condition. In spite of the complications in defining the term disease, it is generally accepted that it refers to "any disturbance or anomaly in the normal functioning of the body that has specifically known biomedical causes and identifiable symptoms, is diagnosed by a physician or other medical experts using specific diagnosis techniques according to standardised and systematic diagnostic codes, and it has known treatment and cure" (Scully, 2004).

Sickness is related to a different phenomenon, namely the social role a person with illness or sickness takes or is given in society in different arenas of life (Scully, 2004). One type of data concerning a more limited aspect of sickness is that relating to sickness absence from work. The differences in the three concepts are summed up by Scully (2004) as follows. In some forms of experienced illness a person never bothers to have the condition confirmed by a physician, either because the problem is too small or because there is not much help available. Some illnesses and diseases do not lead to sickness, and most of them do not lead to sickness absence, either because they do not lead to a reduction in the work capacity needed, or the person may still choose to work.

2.2 Food Security

Food security is defined as "access of all people at all times to enough food for an active healthy life" (World Bank, 1986, cited by Pottier, 1999). Food availability is normally measured in terms of the amount of grains produced, bought, and received freely. It is also determined by assessing food production at the community, district, and national levels by comparing the amounts of harvests expected (forecast) with the amounts of food required so that if the former are less than the latter, early warning can be given in advance about impending food shortage. According to this indicator, in Tanzania food availability is said to be little if one adult cannot obtain at least 270 kg of grains per adult per year (URT, 1999). This amount is little vis-à-vis the amounts of grains consumed in Italy and USA, which are 400 kg and 800 kg respectively per capita per year, but it is higher than the amount of grains consumed in India that is 200 kg per capita per year (Brown and Kane, 1994).

Food is said to be enough on the basis of dietary energy consumed, which is the actual indicator of food security. Focus on the energy aspect is justified by the fact that under nutrition, rather than malnutrition, is nowadays widely regarded as the principal nutritional problem in most developing countries. According to Payne (1990, cited by Sijm, 1997), under nutrition refers to effects of low intake of dietary energy while malnutrition refers to effects of deficiency of any or all nutrients, including micronutrients such as Vitamin A, iron or iodine. Focusing on grains is justified on the basis that they are the main source of dietary energy, especially in developing countries where they supply more than 50% of human food energy intake, and they contain some other nutrients (Brown and Kane, 1994; Kim *et al.*, 1998). With regard to dietary energy intake, a household is food insecure if it consumes fewer than 2,280 kcal per adult equivalent per day. This is the amount recommended by the World Health Organisation as the minimum (WHO) dietary energy intake per adult per day based on WHO's recommendation that dietary energy intake per adult per day should not be less than 80% of the adequate daily caloric intake of 2,850 kcal per adult equivalent per day (Reardon and Matlon, 1989, cited by Wanmali and Islam, 2002). The above amount (2,280) is 80% of 2,850. However, in Tanzania the minimum recommended dietary energy intake is 2,200 kcal per adult equivalent per day (NBS, 2002).

The above method of determining food sufficiency has been criticised by nutritionists; they recommend a method considering the quality of food consumed by all individuals and different nutritional needs of men, women and children. This criticism is partly relevant since food security determination approaches aggregate food sufficiency at the household level, albeit they express food sufficiency per average individual or adult. This aggregation may miss the element of all people, especially where the average DEC is much higher or lower than the amounts eaten by some individuals in the same households. However, in spite of the criticism, and because there can not be nutrition security without basic food security, the Food and Agriculture Organisation (FAO) of the United Nations stipulates that

dietary energy intake goes on being the indicator of choice in assessing food security and when comparing national data (FAO, 1996, cited by Wanmali and Islam, 2002). Nutrition security is defined as "access to nutritionally adequate diet and biological utilization of food consumed such that adequate performance is maintained in growth, resisting or recovering from disease, pregnancy, lactation, and physical work" (Frankenberger *et al*., 1997, cited by Smith *et al*., 2000). Dietary energy consumed in terms of kilocalories is normally expressed per adult equivalent or per capita, both per day. When dietary energy consumed is expressed per capita per day, a household is said to be food insecure if it consumes less than 2,100 kcal per capita per day, which is the global average dietary energy consumption (Silke and Hand-Peter, 2005).

Access to food is measured in terms of possession of resources like agricultural inputs and land to produce food, and cash to buy food. It is also measured by having liquid assets like livestock, mobile phones, radio receivers, watches, chains and others, which can easily be sold to get cash to buy food. This approach of determining food security has resulted from the pioneering work of food entitlements by Amartya Sen (1981). Using this approach, Bne-Saad (2000) conceptualizes that households with access to resources including enough rainfall, good soil quality, water availability, forest resources, fish and seafood, livestock, infrastructure, farm implements, land, and other physical assets are more likely to be food secure than their counterparts who either do not have such access or have poorer access to the resources. The same author also contends that households that have larger land area cultivated and/or irrigated area, good supply and use of inputs, number of cropping seasons, crop diversity, crop yield, food production, cash crop production, a number of sources of non-farm income, and equitable gender division of labour are likely to be more food secure than their counterparts who either do not have the factors or have poor amounts and qualities of them. He also argues that households with good income in terms of total income, crop income, livestock income, wage income, self-employment income, migrant income, producer prices, good markets of their products, and road access are likely to be more food secure than their counterparts who do not have such income. However, the entitlement to food approach has widely been criticized, including the criticism that it relegates food production to a subsidiary activity (Alexandratos, 1997). Despite the criticisms, it still explains food security to a large extent.

The "all times" element of food security heeds seasonality, with a view that at no time in a year should people have food shortage, be it chronic or transitory. Chronic food insecurity means that a household runs a continually high risk of inability to meet the food needs of household members, unlike transitory food insecurity which occurs when a household faces a temporary decline in the security of its entitlement and the risk of failure to meet food needs is of short duration.

2.3 Linkage between Illness and Food Security

Illness is linked to food security in a number of ways, the major ones of which are reviewed in this section. Among subsistence farmers whose main source of food security is production of their own food, being ill means shortage of labour hence little acreage. Considering the fact that among such people more production depends on increased acreage rather than on use of inputs like improved seeds, fertilisers and other agrochemicals to which they have poor access, the consequence (food shortage) is obvious. Not only acreage but also other farm operations like weeding, irrigation, fertiliser application and harvesting are affected, depending on when the household members are ill. Apart from losing labour of the ones who are actually ill, labour of some other household members taking care of the ill is also lost. When such subsistence farmers are ill, even their little income that would be used on agricultural production or on buying food is used on medical care, thereby aggravating food insecurity.

Illness being a cause of food insecurity is supported by empirical information. For example, in a study which was conducted in Ethiopia, it was found that "illness of adults at critical times in the food production process" was among the major causes of food insecurity (Tolossa, 2002). More empirical information on illness constraining food security is reported by World Bank (1993), which found that in a sample of 250 households in Sudan, each of which had lost an average of 40 working hours per year because of malaria alone, this extra work made up for 68% of the lost agricultural labour.

Among self-employed people who expect to generate income from their non-farm activities to buy food and other needs, illness makes them work fewer days, and it lowers their rate of work when they are compelled to work while they are sick. As a result, they generate low income over-time, and this constrains their ability to buy food. Although this relationship between illness and food security is hardly seen in literature, musing over it reveals that it applies on the ground. Illness also constrains food security among workers who are paid salaries or wages. The effect is more among casual labourers whose payment depends on their daily physical work and who are not entitled to sickness leave. For example, World Bank (1993) reports that in Cote d'Ivoire daily wage rates are estimated to be 19% lower,

on average, among men who are likely to lose a day of work per month because of illness than among healthier men.

2.4 The State of Illnesses and Food Security in Tanzania

According to Mwaluko *et al.* (2004), the major causes of illness in Tanzania among out-patients, with the proportions of people succumbing to the illnesses in brackets, are the following ones: malaria (14.0%), enteritis (9.0%), digestive tract diseases (6.3%), accidents (6.0%), respiratory diseases (5.5%), gastroenteritis (5.5%), bronchitis (4.8%), ulcers (4.5%), eye inflammations (3.6%), and pneumonias (3.2%). In that list, the fact that malaria is the most problematic disease is aggravated by failure of the poor to afford buying insecticide-treated mosquito nets (ITNs) to protect themselves and their household members against malaria, which is transmitted by mosquitoes throughout the year, but more seriously during and soon after rainy seasons (NBS and ORC Macro, 2005). With regard to malaria, which is one of the main causes of illness and death in Tanzania, a recent survey, Tanzania HIV/AIDS and Malaria Indicator Survey (TACAIDS *et al*., 2013), shows that its prevalence in the whole Tanzanian population had declined to 9.2% in 2011-12, based on Rapid Diagnostic Test (RDT).

In Rufiji District, illness is a big problem. For example, TMoH (2004) reports that the total burden of disease in the Coastal Region where the district is located is divided into three broad groups of causes. The major group is that of all communicable, maternal, perinatal and nutritional causes, which accounts for 75% of the total burden. The second group is that of non-communicable diseases, which accounts for 12% of the total burden. The third group is that of external causes such as injuries, which accounts for about 4% of the burden. The remaining 9% of the burden is undetermined by available methods. Moreover, TMoH (2004) reports that more than 26% of the total burden of disease of the population is accounted for by acute febrile illness, predominantly malaria (down from 37% in 1999).

With regard to food security in Tanzania, the incidence of food insecurity was 16.6% in 2007 based on a food monetary poverty line of TSh 10,219 per adult equivalent for 28 days and on a caloric poverty line of 2,200 kCal per adult equivalent per day (NBS, 2009). In Rufiji District the incidence of food insecurity was 27% in 2001, while the national food insecurity incidence was 18.7% (NBS, 2002).

3. Source of Data for this Paper

Data for this paper were collected in 12 villages which are Ikwiriri South, Umwe Central, Mgomba South, Kibiti A, Kibiti B, Kimbuga, Mchukwi B, Mlanzi, Bungu A, Jaribu Mpakani, Uponda, and Pagae. The villages are located in six wards in the Rufiji Health and Demographic Surveillance System Area, which was chosen for the research because it is a sentinel site for health data collection for monitoring the impact of health reforms, and because food insecurity in the district is worse than the national situation of food insecurity. The area extends between 7.47^0 and 8.03^0 latitudes and 38.62^0 and 39.17^0 longitudes. Ikwiriri Sub-town, which is the headquarter of the Rufiji HDSS Area, is located about 178 km South of Dar es Salaam that is the commercial capital city of Tanzania.

The sampling frame was all the households in the Rufiji HDSS Area, which were 16,567 in January 2005. A sample of 225 households was selected through proportionate stratified sampling, each of the 6 wards of the Rufiji HDSS Area being a stratum and using a sampling fraction of 225/16,567, which was about 0.01358. Systematic sampling was used to select the households that were included in this study. Data collection was done using a structured question which was administered at the household level referring to the 2005/2006 agricultural season that extended from 1/7/2005 to 30/6/2006.

Data were analysed using the Statistical Package for Social Sciences whereby descriptive and inferential analyses were done. Dietary energy consumed (DEC) was calculated based on only grains consumed because grains are the main staple foodstuffs in the research area, and their importance as a basis for DEC determination is justified by literature, as seen in Section 2.2. In Tanzania cereals supply 80% while other foods supply 20% of dietary energy (Seshamani, 1981, cited by Ashimogo, 1995). Therefore, DEC obtained from grains were inflated by multiplying it by 100/80 to cater for energy from other foods. Tables for Proximate Composition of Foods Commonly Eaten in East Africa (West *et al.*, 1988) were used for the calculation of dietary energy consumed. The tables show that 1 kg of white maize flour as well as 1 kg of rice contains 3350 kcal. Therefore, the amounts of rice and maize eaten in kilograms were multiplied by 3350 to get the amounts of kcal consumed in maize and rice. DEC obtained using the above procedure were multiplied by100/80 to take into account energy from other sources. DEC amounts obtained in that way were divided by the number of members in households to get DEC per capita. The DEC obtained in that way were compared between households where there was illness and where there was no illness and in households where household members were ill for fewer days and where they were ill for more days.

4. Empirical Findings of this Study

4.1 Health Status of the People during the Research

More than seventy per cent of the household heads (159 out of 225, which is 70.7%) were married and 66 (29.3%) were unmarried. The households contained a total of 1,193 individuals. The average household size was 5.3 people; the minimum and maximum numbers of people in a household were 1 and 11, respectively. The respondents (household heads or their representatives) were asked to state the health status of each of the household members in terms of very healthy, healthy, ill, and very ill based on their own mental and physical feelings of what illness was. Such information was available for 1,181 persons out of the 1,193 persons, and is summarized thus: 80.7% were very healthy; 6.5% were healthy; 6.7% were ill; and 6.3% were very ill. Collapsing very healthy and healthy into healthy, and ill and very ill into ill, one finds that 1,027 (87.0%) of the people were healthy while 154 (13.0%) were ill. Those who were ill lived in 93 (41.3%) of the 225 households, while the rest lived in 132 (58.7%) of the households.

The data give good information that very many people were healthy. However, this is because they were asked the question late in a dry season when disease incidences were few. During that period there are few mosquitoes that spread malaria and less water contamination that causes water-borne diseases, unlike during a rainy season like March to May when mosquitoes are many and water contamination is high, partly due to wastes from pit latrines cascading into some sources of water for domestic uses. Had the question been asked during a rainy season, the percentage of people being ill would have been higher. And, if the judgement of being healthy or ill had been based on medical diagnosis including testing blood, urine, and faecal samples, the number of ill people would have been much higher.

4.2 Illnesses the People Were Suffering from

The respondents were also asked to state the illnesses which their household members were suffering from. The illnesses they said are listed in Table 1. Although some of what the respondents mentioned to be diseases were not diseases *per se*, like fever that is a symptom of various diseases, it is evident that malaria was the most important disease in the area. The fact that some diseases that are opportunistic ones for HIV/AIDS, particularly TB, were mentioned shows that HIV/AIDS was prevalent in the area.

4.3 Number of Days the Ill Had Been Ill and Chronic Illnesses

The respondents were asked to state the number of days that the ill had been ill. Weeks, months and years were converted into days by multiplying them by 7, 30 and 365 days, respectively. It was found that the people had been ill for at least 1 day and at most 18,250 days. The highest figure (18,250 days) was for one who had had asthma for 50 years. The numbers of days that household members had been ill were used to identify some of them who were chronically ill. According to USAID/UNAIDS/ UNICEF/WHO/ CDC (Undated), the term chronically ill means "an adult aged 15-49 years being ill for at least three consecutive months during the last 12 months that received external unpaid help in caring for the patient or replacing lost income." In accordance with this definition, the number of chronically ill persons was 63 who were living in 45 households. The illnesses that the chronically ill people were suffering from were mentioned for only 56 of the 63 chronically ill persons, and are summarised in Table 2. Joints and body pains being the leading chronic illnesses in Table 2 implies that the respondents failed to realise some diseases, which were behind the pains, just like the way they failed to realise diseases that were behind fever.

4.4 Food Security with Different Durations of Illness

Comparison of dietary energy consumed (DEC) between households which had chronically ill individuals (ill for 90 and more days) and those which didn't have such individuals showed that the mean DEC were 1,662.7 and 1,948.0 kcal, respectively, and that the means were not significantly different ($p = 0.191$). Further comparison was done by adding up the number of hours each household member had been ill into the 'total number of hours household members were ill', to measure illness at the household level. Then the numbers of days were grouped into five groups at appropriate cutting points to include reasonable numbers of households in each of the groups. The groups were: 1st Group (up to one week), 2nd Group (more than one week up to one month), 3rd Group (more than one month up to 3 months), 4th Group (more than 3 months up to 3 years), and 5th Group (more than 3 years). The mean DEC obtained showed mixed results. As expected, the fifth group had the least amount of DEC and the third group had less DEC than the second one. However, contrary to what was expected, the first group had less DEC than the second one, and the fourth group had more DEC than the third one. The DEC in the five groups did not differ significantly ($p = 0.135$). This led the researchers to explore the differences further using multiple comparisons of differences in the average amounts of DEC per capita per day in the five groups; the results showed that, with many days of illness, DEC amounts differ significantly. This was authenticated by the mean difference (723.96) between

the 4th and 5th quintiles that was significant (p = 0.021).

4.5 Illnesses and their Effects on Food Security

Besides the above analysis of illnesses and food security, the respondents were asked if any illness had had any negative impact on food production. Forty out of the 225 respondents responded positively and mentioned the following main illnesses, with the percentages of those who said so in the brackets: malaria (22.5%), TB (15.0%), body/joints pains (12.5%), stomach aches (10.0%), and chest/coughing (5.0%). They specified that the illnesses had affected food security as follows, with the percentages of those who said so in the brackets: less cultivation (57.5%), using much time to care for the sick (45.0%), buying medicines in lieu of agricultural inputs (30.0%), less harvests (10.0%), no cultivation at all (2.5%), and buying special food for the sick in lieu of agricultural inputs (2.5%).

The estimated amounts of acreage; agricultural costs (cash capital); family members participating in agriculture; hours spent on agriculture; and maize, rice, cassava and cashew nuts that would have been harvested if there had been no illness were subtracted from those realised in spite of the illnesses, to get differences in the averages. The differences were expressed as percentages of the would-have-been values and are presented in Table 3. Moreover, in Table 3 the mean amounts of various agricultural factors realised despite illness are compared using a t-test with the would-have-been realised values, if there had been no illness. The results in Table 3 show that illnesses caused a lot of decline in agricultural production. This is indicated by the mean percentage changes in various agricultural factors being negative and the values realised 'despite illnesses and the 'would-be-realised values if there had not been illnesses being significantly different.

5. Conclusions and Recommendations

The proportion of people who were ill in September and October 2006 when the survey was being conducted that was 13% shows that just few people were ill, in view of the fact that, that time was late in a dry season when malaria incidences were on the decrease due to mosquitoes that transmit it being fewer during that period, unlike during a rainy season and soon after it. The finding that fever was the third among the top ten illnesses implies that the respondents had little knowledge of diseases; fever is a symptom of various diseases, but the respondents considered it to be a disease. On the basis of this conclusion, the government is urged to help the people of Rufiji District keep the incidences of illness low so they do not differ much between dry and rainy seasons. This will happen if the people of the district take a lead in heeding various measures for preventing illnesses, including boiling drinking water to prevent water-borne diseases and using insecticide-treated mosquito nets to protect themselves and their household members against mosquitoes that are more during rainy seasons.

The findings of this research which showed that the top most illness that the ill persons were afflicted with was malaria and that the incidence of suffering from it was 29.9%, which is higher than the national incidence of the same illness reported in Section 2.4, implies that in Rufiji District, and possibly in other coastal districts, malaria incidences are higher than in other places. Moreover, since the list of the top ten illnesses that people were suffering from included chest illnesses and TB, which are among opportunistic illnesses for HIV/AIDS, it indicates that HIV/AIDS was a problem in the research area. Fever and joint pains having been mentioned among major illnesses shows that the respondents had little knowledge of diseases. According to the fact that people seemed to have little knowledge of diseases, it is recommended that the people of Rufiji District should increase the frequencies of undergoing medical check-ups, including laboratory investigation, to be sure of the types of illnesses they have so they can go timely for appropriate treatment.

Since there were big differences between actual and estimated amounts of acreage, family labour, agricultural costs, hours of work on farm, and crop products harvested (the amounts estimated if there had not been illness being higher); food security decline due to illness measured using the above proxy indicators of food security was high. However, this does not translate automatically or proportionately into food insecurity measured using dietary energy consumed since the custom of giving one another food in Rufiji District helps mitigate the magnitude of food insecurity, albeit it is not a reliable way of dealing with food insecurity. In view of this conclusion, the people of Rufiji District are urged to always take reliable preventive and curative measures against illnesses lest illness of any household member constrains agricultural production and other economic activities.

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First Author: Kim Abel Kayunze holds a PhD in Rural Development from Sokoine University of Agriculture, Tanzania (www.suanet.ac.tz), where he is a Senior Lecturer in Rural Development. He is also a Postdoctoral Research Fellow in One Health Policy with the Southern African Centre for Infectious Disease Surveillance

(SACIDS) (www.sacids.org). His e-mail addresses are kimkayunze@yahoo.com and kayunze@suanet.ac.tz.

Second Author: Eleuther Alphonce Mwageni (PhD) is an Associate Professor in Applied Population Studies and the Deputy Vice Chancellor (Planning, Administration, and Finance at Ardhi University, P. O. Box 35176, Dar es Salaam, Tanzania. His E-mail addresses are: emwageni@yahoo.co.uk and mwageni@hotmail.com .

Table 1. Main illnesses at the household level (n = 154)

Main Illness	**%**	**Main Illness**	**%**	**Main Illness**	**%**
Malaria	29.86	Diarrhoea	1.95	Deafness	0.65
Joints/ Body pains	19.50	Psychiatry	1.95	Paralysis	0.65
Fever	9.09	Coughing	1.30	Blood pressure	0.65
Chest/TB	5.84	Skin rushes	1.30	Toothache	0.65
Headache	5.84	Epilepsy	0.65	Wounds	0.65
Stomach aches	4.55	Hernia	0.65	Anaemia	0.65
Asthma	3.25	Madness	0.65	Pneumonia	0.65
Eyes	3.25	Dizziness	0.65	Numbness	0.65
UTI/STI	2.60	Mumps	0.65	-	-
Total (%)	**100.00**				

Table 2. Chronic illnesses (n = 56)

Illness	**%**	**Illness**	**%**	**Illness**	**%**
Joints/body pains	42.8	Psychiatry	3.6	Scrotal hernia	1.8
Stomach aches	10.7	Blood pressure	1.8	Madness	1.8
Chest/TB	7.1	Deafness	1.8	UTI/STI	3.6
Asthma	5.3	Dizziness	1.8	Anaemia	1.8
Fever	5.3	Epilepsy	1.8	Malaria	1.8
Headaches	3.6	Eyes	1.8	Pneumonia	1.8
Total (%)	**100.0**				

Table 3. Changes in various agricultural factors with illness

Agricultural factors	**n**	**Mean**	**Mean difference**	**Mean change (%)**	**t-value**	**p-value**
Acreage despite illness	30	2.1	-0.9	-37.3	-4.22	0.000
Acreage if illness was not there	30	3.0				
Agricultural costs despite illness	26	21646.2	-18569.2	-71.2	-2.61	0.015
Agricultural costs if illness was not there	26	40215.4				
Family members who participated in agriculture	31	1.9	-1.1	-38.2	-5.85	0.000
Family members that would have participated	31	3.0				
Hours spent on agriculture despite illness	29	5.6	-2.6	-40.1	-4.03	0.000
Hours that would have been spent	29	8.2				
Maize harvested despite illness	28	59.9	-108.5	-71.6	-4.76	0.000
Maize that would have been harvested	28	157.4				
Rice harvested despite illness	29	103.8	-237.1	-77.1	-2.33	0.028
Rice that would have been harvested	29	317.2				

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